A2.0 SOCIAL AND ECONOMIC IMPACTS

A2.1 PROPOSED ACTION

A2.1.1 Construction

The construction of the Tongue River Railroad Company's (TRRC) proposed railroad would begin in 1985 and continue until 1989. The construction season would be limited to 7 months, generally excluding the winter months. During this construction period, a core of employees--50 in number--would be located in the project area. The total work force would fluctuate between 50 and 570 workers. The average monthly employment during the first 2.5 years of construction would be approximately 250 workers. Table A2-1 presents the anticipated employment in person-year equivalents.[1]

TABLE A2-1

EMPLOYMENT FOR CONSTRUCTION OF THE PROPOSED ACTION

	EMPLOYMENT BY YEAR[a]						
CONSTRUCTION ACTIVITY	1985	1986	1987	SUBTOTAL	1988	1989	TOTAL
Mobilization	12.5	--	--	12.5	1.2	--	13.7
Right-of-way Cleaning	6.7	--	--	6.7	0.6	--	7.3
Drainage	10.8	14.3	4.3	29.4	1.7	1.1	32.2
Major Structures	16.6	60.9	9.3	86.8	4.2	4.2	95.2
Major Earthwork	45.6	129.5	25.8	200.9	12.9	6.5	220.3
Sub-ballast	--	17.5	5.0	22.5	1.7	0.5	24.7
Trackage	--	24.5	24.5	49.0	2.4	2.4	53.8
Ballast	--	6.3	8.3	14.6	0.9	1.1	16.6
Yard Facility (Trade)	--	18.5	--	18.5	--	--	18.5
Buildings (Miles City)	3.7	--	--	3.7	--	--	3.7
Satellite Buildings (Ashland)	--	4.0	1.3	5.3	--	--	5.3
Signals and Communication	--	--	18.0	18.0	--	1.7	19.7
Right-of-way Fencing	--	4.2	2.5	6.7	0.4	0.2	7.3
Demobilization	--	--	25.0	25.0	--	2.4	27.4
Clean-up	--	--	8.3	8.3	--	0.8	9.1
Project Management	4.0	7.3	3.5	14.8	0.7	0.7	16.2
Construction Management	8.0	14.7	7.0	29.7	1.5	1.4	32.6
TOTAL	107.9	301.7	142.8	552.4	28.2	23.0	603.6

[a] Employment figures are stated in person-year equivalents; one person-year equivalent equals one person working 12 months.

Forty percent of the construction work force is likely to be drawn from local areas.[2] The remainder (60 percent) would consist primarily of transient laborers, persons who move with construction employment opportunities. The characteristics typical of a work force such as that required for the TRRC's project include a median age of 36 years, an average household size of 1.3 persons, 16 percent of the workers with families, and 66 percent of the workers with spouses.[3]

A2.1.1.1 Impacts to the Local Economy

The expenditures for construction salaries, materials, and services, averaging about $28 million annually for the period 1985-1989, would affect the local economy. The projected income data for the railroad construction employment is presented in Table A2-2. Other expenditures--primarily for fencing materials, major structure materials, sub-ballast, and various types of equipment--are shown in Table A2-3. These expenditures for materials and services and those expenditures made by the construction workers would create indirect and nonbasic employment. These jobs, though not directly funded by the TRRC or the potential mines, would result in support of the basic employment provided by those entities. Table A2-4 depicts the number of indirect and nonbasic jobs created because of the railroad construction.[4]

The influx of a large number of relatively transient workers could create some economic dislocations, such as the temporary shortage of goods and services, and inflation. On an area-wide basis, however, the nonlocal construction workers are unlikely to alter the economic environment significantly. Problems could arise in smaller communities--for example, Ashland--that cannot readily absorb such economic changes. The increased demand for local labor, caused by the railroad construction, could affect the farm labor supply and, thus, ranchers who hire full-time or part-time labor--about 50 to 75 percent of the project area ranchers.[5] Not only could the availability of labor be reduced, but the cost of labor could increase, because ranchers might be forced to pay higher wages to compete with those wages offered by the construction companies.

Fiscal Impacts

The first step in the analysis to identify the effect of the railroad construction upon the net fiscal position of local governments was to estimate the costs of public services and public facilities that would be required because of that railroad construction. These estimates were compared to estimates of the revenues that are projected to accrue to the local governments because of rail line construction. The comparison was performed by jurisdiction and involved county and city governments, as well as school districts.[6]

The estimates of total public costs were developed using those unit costs corresponding to the various types of required services and facilities and specific to each jurisdiction. The procedure used to

TABLE A2-2

CONSTRUCTION EMPLOYMENT INCOME DATA

CONSTRUCTION ACTIVITY	HOURLY WAGE[a]	ANNUAL INCOME FOR ALL EMPLOYEES (1982 $000) 1985	1986	1987	1988	1989	ANNUAL AVERAGE INCOME PER EMPLOYEE[b]
Mobilization	$ 9.00	$ 270	$ --	$ --	$ 26	$ --	$ 21,600
Right-of-way Cleaning	9.12	147	--	--	--	--	21,890
Drainage	9.09	236	312	94	37	24	21,820
Major Structures	9.10	362	1,330	203	92	92	21,840
Major Earthwork	9.10	996	2,828	563	282	142	21,840
Sub-ballast	9.09	--	382	109	36	12	21,820
Trackage	9.10	--	535	535	52	52	21,840
Ballast	9.09	--	137	181	19	24	21,820
Yard Facility	15.49	--	688	--	--	--	37,176
Buildings (Miles City)	9.20	82	--	--	--	--	22,080
Satellite Buildings (Ashland)	9.06	--	87	28	--	--	21,740
Signals and Communication	15.25	--	--	2,387	--	25	32,600
Right-of-way Fencing	9.12	--	92	55	8	5	21,890
Demobilization	9.00	--	--	540	--	52	21,600
Clean-up	9.10	--	--	181	--	17	21,840
Project Management	12.98	125	227	109	22	21	31,150
Construction Management	11.00	211	388	185	38	38	26,400
TOTAL		$2,429	$7,006	$5,170	$612	$504	$ 26,450

[a] Rates exclude fringe benefits and the employer's payment of taxes. Total labor costs would average $14.35 per hour if these items were included.

[b] Assumes each person-year equivalent is 8 hours per day, 25 days per month, 12 months per year. Therefore, income equals (8)(25)(12)(wage rate). For example, the total is derived as follows: (8)(25)(12)(11.02) = $26,448, rounded to $26,450.

estimate potential tax receipts comprised two steps: (1) estimating tax revenue by tax source and by taxing jurisdiction; (2) estimating interjurisdictional revenue transfers. The tax revenues estimated to accrue to each jurisdiction, by tax sources, were summed to determine an estimate of the total revenue by jurisdiction. All calculations are based on constant 1981 dollars.[7] Construction-related cost and revenue data by year are included in calculations for the entire analysis period presented in the discussion of fiscal impacts due to related actions (section A2.1.4).

TABLE A2-3

PROJECTED RAILROAD CONSTRUCTION EXPENDITURES
BY LOCATION OF EXPENDITURE, FOR THE PROPOSED ACTION

ITEM	PROJECT AREA	BILLINGS	OTHER	TOTAL
Right-of-way Fencing	$ 876,910	$ 97,434	$ ---	$ 974,344
Major Structures	617,593	527,289	1,140,539	2,285,421
Ballast	---	---	9,571,458	9,571,458
Sub-ballast	521,148	---	---	521,148
Rail	---	9,213,233	9,213,233	18,426,465
Equipment	5,047,407	40,609,338	46,272,769	91,929,514
TOTALS	$7,063,058	$50,447,294	$66,197,999	$123,708,350

TABLE A2-4

INDIRECT AND NONBASIC EMPLOYMENT
DUE TO CONSTRUCTION OF THE RAILROAD

YEAR	PROPOSED ACTION
1985	33
1986	90
1987	43
1988	8
1989	7
TOTAL	181

The results indicate that, during the construction period, some jurisdictions will experience revenue surpluses and other jurisdictions will experience net deficits. The reason for the deficits is that these latter jurisdictions would experience impact population but would not accrue TRRC tax payments. On a county by county basis, only Powder River County would experience a net fiscal deficit for the entire construction period. The three county area would experience a revenue surplus for the period in excess of $8 million.

Demand for Services

The construction of the proposed rail line would increase the population above the baseline, or "no action" level, on the annual average of 250 people from 1985 through 1987 and 25 people annually for the period 1988 to 1989. The impact population would comprise only 2 percent of the projected area population at the peak employment level.

This impact population's characteristics of age, sex, and marital status would not differ significantly from those characteristics of the baseline population. Its population/employment ratio would be 1.8, below the baseline ratio of 2.2. The impact on the demand for public services would involve this impact population.

Several factors would reduce an inordinate increase in service demands. Nonlocal workers primarily would reside in construction camps, which would be self-contained units. In addition, construction workers who do not reside in the construction camps most likely would locate in Miles City, which can absorb such population increases more easily than can smaller communities.[8]

On an area-wide basis, the impact population is unlikely to alter the social environment significantly. Some problems could arise in smaller communities, such as Ashland. For example, the short term influx of a relatively large number of transient workers into these smaller communities could increase crime, alcohol abuse, and conflicts between the local residents and the nonlocal workers.[9]

A2.1.1.2 Impacts to the Northern Cheyenne Indian Reservation

The construction of the proposed rail line would result in very little, if any, impact to the social and economic life on the Northern Cheyenne Reservation. The majority of the construction work force (60 percent) would be transient workers, living off the reservation either in facilities provided by the TRRC or in Miles City. Trips made by these workers for goods and services likely would be to communities off the reservation.[10] Thus, any economic impacts and social contacts probably would occur in these communities.

The percentage of the construction force drawn from local areas (40 percent) could include workers from the Northern Cheyenne Reservation. The construction of the proposed rail line thus could reduce the unemployment rate on the reservation. Since the Northern Cheyenne workers probably would reside on the reservation, some temporary impact to the reservation's economy as a result of their income expenditure could occur.

A2.1.2 Operation and Maintenance

The operation and maintenance of the proposed rail line would create jobs that would vary in number by the amount of coal produced and transported. The employment projections for the operation of the railroad are presented in Table A2-5, as are income data associated with the jobs. The operation of the railroad would indirectly increase employment in the railroad sector, for employees for Burlington Northern, Inc. The estimates of this indirect basic employment were derived as a function of projected TRRC train volumes and of the current ratio of Burlington Northern employees to operating coal trains (see Table A2-6).

TABLE A2-5

BASIC DIRECT RAILROAD OPERATING EMPLOYMENT BY MINE PRODUCTION SCENARIO AND INCOME LEVEL

	LOW PRODUCTION SCENARIO				MEDIUM PRODUCTION SCENARIO				HIGH PRODUCTION SCENARIO			
		INCOME LEVEL				INCOME LEVEL				INCOME LEVEL		
YEAR	TOTAL EMPLOYMENT	$67,500	$27,500	$15,000	TOTAL EMPLOYMENT	$67,500	$27,500	$15,000	TOTAL EMPLOYMENT	$67,500	$27,500	$15,000
1987	30	7	15	8	30	7	15	8	30	7	15	8
1988	33	7	17	9	33	7	17	9	33	7	17	9
1989	38	7	21	10	38	7	21	10	38	7	21	10
1990	38	7	21	10	38	7	21	10	41	7	23	11
1991	38	7	21	10	38	7	21	10	49	7	28	14
1992	47	7	27	13	47	7	27	13	60	7	35	18
1993	55	7	32	16	55	7	32	16	66	7	39	20
1994	55	7	32	16	55	7	32	16	66	7	39	20
1995	55	7	32	16	58	7	34	17	66	7	39	20
1996	58	7	34	17	64	7	38	19	69	7	41	21
1997	61	7	36	18	66	7	39	20	78	7	47	24
1998	66	7	39	20	66	7	39	20	83	7	51	25
1999	72	7	43	22	75	7	45	23	89	7	55	27
2000	72	7	43	22	83	7	51	25	112	7	70	35
2001	72	7	43	22	92	7	57	28	117	7	73	37
2002	78	7	47	24	106	7	66	33	146	7	93	46
2003	89	7	55	27	117	7	73	37	157	7	100	50
2004	92	7	57	28	117	7	73	37	157	7	100	50
2005	92	7	57	28	115	7	72	36	157	7	100	50
2006	83	7	51	25	109	7	68	34	146	7	93	46
2007	92	7	57	28	115	7	72	36	146	7	93	46
2008	98	7	61	30	120	7	75	38	146	7	93	46
2009	103	7	64	32	120	7	75	38	146	7	93	46
2010	109	7	68	34	126	7	79	40	146	7	93	46

TABLE A2-6

INDIRECT EFFECT OF TRRC TRAFFIC ON BN EMPLOYMENT

	SCENARIO		
YEAR	LOW	MEDIUM	HIGH
1987	17	17	17
1988	23	23	23
1989	35	35	35
1990	35	35	41
1991	35	35	52
1992	52	52	76
1993	69	69	93
1994	69	69	93
1995	74	76	93
1996	76	87	98
1997	81	89	115
1998	85	89	127
1999	97	113	138
2000	97	126	183
2001	97	148	196
2002	115	172	254
2003	138	195	277
2004	144	195	277
2005	144	193	277
2006	127	182	252
2007	144	193	252
2008	156	205	252
2009	167	205	252
2010	180	216	252

It is assumed that the TRRC would begin operations with experienced personnel. After the first 2 years of operation, however, the railroad would institute the training of inexperienced persons to fill new positions. Following these first 2 years, 90 percent of all new positions could be filled by inexperienced persons. Since most railroad-operating personnel probably would be located in Miles City, the demand for services and other sociological impacts would be concentrated primarily in that area.[11]

A2.1.2.1 Impacts to the Local Economy

Expenditures made locally by the railroad company would create additional employment. The TRRC may spend a projected $100,000 annually for utilities and for miscellaneous supplies provided by local establishments in support of railroad operations. Table A2-7 presents the total employment predicted to occur because of railroad operation and maintenance, under the medium production scenario.

TABLE A2-7

TOTAL EMPLOYMENT DUE TO OPERATION AND MAINTENANCE
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO

YEAR	BASIC DIRECT	BASIC INDIRECT	OTHER NONBASIC	TOTAL, INCLUDING DIRECT EMPLOYMENT
1987	30	17	28	75
1988	33	23	34	90
1989	38	35	44	117
1990	38	35	44	117
1991	38	35	44	117
1996	64	87	91	242
2001	92	148	144	384
2006	109	182	175	466
2010	126	216	191	533

Potential Industrial Development Due to the Availability of Rail Service

The rail line would serve potential coal mines in the Tongue River region. The range of potential development is indicated by the various scenarios. Another potential TRRC rail user is the lumber yard in Ashland, although the future of that yard is unclear. The other current industry that could use TRRC rail service is agriculture. However, it is unlikely that a significant change in the current transportation services used by this sector would occur with the establishment of the TRRC's railroad.

Changes in the Tax Base

The adverse impact on the tax base associated with the impact population would be negligible and would be repeatedly offset by the increased tax base associated with the railroad. It is unresolved whether land adjacent to the rail line would experience devaluation. The loss of land for ranching, the restriction of the use of land, and those management problems and inconveniences associated with a railroad generally could render a ranch property less attractive. Although the magnitude of the potential devaluation is uncertain, it appears to be negligible. When interviewed, most ranchers who own property on other rail lines expressed the opinion that the rail line would exert a negative impact on adjacent property values. At the same time, they have witnessed few, if any, detrimental effects on their own property values, and little evidence currently exists to substantiate the opinion.[12] Isolated property cases that would be affected adversely include subdivisions and those areas in Miles City adjacent to the abandoned Milwaukee Road line. The demand for community development associated with coal mining, however, most probably would cause an overall increase in subdivision land values.

A2.1.2.2 Impacts to the Northern Cheyenne Indian Reservation

The operation and maintenance of the proposed railroad could create employment for members of the Northern Cheyenne tribe, whose income expenditure then would have an impact on the reservation's economy. However, any impact probably would not be felt until after the first 2 years of operation, when the railroad would institute the training of inexperienced workers to fill new positions. If railroad operating personnel were located in Miles City (as suggested in section A2.1.2), the economic and social impacts would occur off the reservation.

A2.1.3 Downline Impacts

The construction and the operation of the proposed TRRC railroad would not affect downline social and economic patterns.

A2.1.4 Related Actions

The construction of the proposed TRRC railroad is expected to encourage the development of coal mines in the Tongue River region. The construction and the operation of those mines to be served by the railroad (related actions) would change the economic, demographic, and social character of the project area. The railroad and the coal mines would provide direct basic employment and income that, through multiplier effects, would induce additional employment and income. Changes in demographic patterns would affect the local economy, the demand for public facilities, the fiscal balance of local jurisdictions, and, possibly, lifestyles in the area. This section discusses these various anticipated impacts, as determined by means of computer modeling.

A2.1.4.1 Methods

BREAM Model

The Bureau of Reclamation's Economic Assessment Model (BREAM) was employed to project how the project area's economic and demographic characteristics might change.[13] The BREAM model generated seven different economic and demographic projections for the project area. The "baseline case" represents the project area's economic and demographic characteristics assuming that the proposed railroad and its related actions are not implemented. The remaining six futures represent the construction of the proposed railroad and various alternatives to it in combination with three different levels of coal production--low, medium, and high. By subtracting the baseline future from the Proposed Action and from the related action futures, the net economic and demographic changes associated with the anticipated development can be determined. These changes are referred to as the "impact employment" and the "impact population."

Assumptions

The assessment of possible social and economic impacts in the project area required the formulation of certain assumptions.[14] The following is a brief discussion of those assumptions.

Mine Employment. Mine employment is a function of the levels of coal production and of the timing of the mines' construction and operation. The timing of mine construction and the level of coal production cause variations in employment impacts among the scenarios. These employment projections --developed by the BREAM model and based on the coal production scenarios and on the employment schedule submitted by Montco to the Montana Department of State Lands--are presented in Table A2-8. An average annual income of $30,000 per worker was assumed.[15]

Source of Labor. The construction of the railroad and of the related actions would provide employment for local or for nonlocal workers based upon two factors: (1) the amount of the basic employment and its skill requirements; (2) the characteristics of the local labor force. Estimates of the local and the nonlocal divisions of employment applied the assumption that workers currently employed in the construction of Colstrip Units 3 and 4 would be available for employment at the Montco Mine. Since the other mines would be developed at later dates, they could not draw from the work force currently at Units 3 and 4. Labor from the Montco Mine could be attracted to the other four mines, when the coal reserves of the Montco Mine are depleted.

To estimate the number of workers currently employed in the construction of Units 3 and 4, who then would be employed in constructing the Montco Mine, data concerning labor numbers and skills available from the construction of Units 3 and 4 were obtained and then compared to the Montco Mine's construction requirements.[16] Of those workers with the requisite skills, who would be available for employment by Montco, approximately 55 percent were determined to be actually employed by Montco. This amount included all of the local workers and one-half of the nonlocal workers currently involved in constructing Colstrip Units 3 and 4.[17]

TABLE A2-8

PROJECTED MINING EMPLOYMENT BY SCENARIO, 1984-2010[a]

YEAR	LOW	MEDIUM	HIGH
1984	45	45	45
1985	490	490	490
1986	480	480	480
1987	160	160	160
1988	190	190	190
1989	220	220	265
1990	250	250	740
1991	280	280	760
1992	335	335	510
1993	380	425	570
1994	445	890	610
1995	970	960	755
1996	960	655	1,210
1997	685	760	1,255
1998	750	1305	980
1999	780	1750	1,120
2000	825	1455	2040
2001	1,315	1,185	2,150
2002	1,810	1,320	1,560
2003	1,560	1,465	1,760
2004	1,210	1,940	1,880
2005	1,135	1,870	1,800
2006	1,560	1,525	1,890
2007	1,515	1,455	1,905
2008	1,220	1,500	1,960
2009	1,290	1,560	2,000
2010	1,380	1,660	2,040

[a] Includes construction and operation employment

The Montco Mine's labor force was calculated according to these criteria:

(1) 15 percent nonlocal
(2) Colstrip local, from Units 3 and 4
(3) 15 percent Indian
(4) Colstrip nonlocal and own construction
(5) Other nonlocal
(6) Nonlocal, calculated as a residual

The steps for calculating the employment composition of the other mines was different. The criteria were the following:[18]

(1) 15 percent nonlocal
(2) 15 percent Indian
(3) Montco and own construction
(4) Other local
(5) Nonlocal, calculated as a residual

Residential Location of Railroad and Mine Employees. The potential residential location of the railroad and mine employees was determined by using a three-step process. The first step was to determine residential boundaries, using the following factors:

(1) Area enumeration districts used to report 1980 census data;
(2) Existing community boundaries;
(3) Definition of primary impact areas in more detail than the secondary impact areas;
(4) A 15-community or -area limitation in the model for the allocation of direct employment

The second step involved the use of a gravity model to distribute nonlocal workers.[19] The resultant gravity model distribution provided a basis for discussing the allocation of nonlocal workers with individuals knowledgeable of the project area.[20] These individuals participated in the third step of the allocation process by suggesting modifications to the gravity model distributions based upon their knowledge of the current capability of communities to absorb additional population, of the development potential of communities, and of the preferences of potential workers regarding commuting distance.

Based upon the information generated through this three-step process, the residential distribution of nonlocal mine workers was established (see Table A2-9).

TABLE A2-9

POTENTIAL RESIDENTIAL DISTRIBUTION OF NONLOCAL MINE WORKERS

RESIDENTIAL LOCATION	MINE #4		ALL OTHER MINES	
	CONSTRUCTION	OPERATION	CONSTRUCTION	OPERATION
Ashland				
Powder River	30%	36%	28%	40%
Rosebud	20	33	20	27
Birney	--	1	3	5
Broadus	--	--	14	14
Colstrip	50	30	30	11
Forsyth	--	--	3	--
Miles City	--	--	--	--
Other	--	--	2	3
TOTAL	100%	100%	100%	100%

Other Assumptions. Additional assumptions for the economic and demographic projections are presented in Table A2-10.

TABLE A2-10

BASIC EMPLOYMENT ASSUMPTIONS, BASELINE SCENARIO

EMPLOYMENT SECTOR	COUNTY	BASIC EMPLOYMENT ASSUMPTIONS
Agriculture	All counties	2% decline through 1985; 1% decline from 1986-1990; 0.5% decline from 1991-2010
Mining	Custer County	No basic employment
	Powder River County	Coal Creek production schedule (seven employees from 1985 on); Belle Creek Oil Field--begins decline in 1990; no employment by 2000; oil and gas exploration--gradual decline to zero by 2000
	Rosebud County	Work schedules for Long Construction, Big Sky Mine, and Western Energy
Construction	Custer County	Held constant at about 260 employees except for some growth (33%) between 1980 and 1987 associated with Williston Basin; after 1987 a gradual decline to 1980 levels by 2010 was assumed
	Powder River County	Held constant except for construction activity associated with Belle Creek Oil Field, which follows the mining employment trend
	Rosebud County	Work schedules for Bechtel, Montana Power Company, Big Sky Mine, Colstrip town construction, and other mines were used; known highway construction (1980-1983) was assumed

TABLE A2-10. BASIC EMPLOYMENT ASSUMPTIONS (continued)

EMPLOYMENT SECTOR	COUNTY	BASIC EMPLOYMENT ASSUMPTIONS
Manufacturing	Custer County	Increase of 50% from 1980 through 1990 attributable to Roundup Powder; constant thereafter
	Powder River County	Ashland sawmill--constant
	Rosebud County	An increase of 42% from 1980 through 1983; constant thereafter
Transportation and Utilities	Custer County	Small decline from 1980 through 1985, resulting from Milwaukee RR lay-offs; gradual increase of 1% annually thereafter, attributable primarily to railroad employment
	Powder River County	Constant at 1980 level
	Rosebud County	Steady increase from 1980 through 2010 (150% increase overall), as a result of increased railroad (BN), trucking, and Montana Power Company employment
Trade	Custer County	Small, steady increase (historical trend) amounting to 5% by 2010
	Powder River County	Small, steady decline (historical trend) amounting to 11% by 2010
	Rosebud County	Small increase (5%) to 1983, constant thereafter
Finance, Insurance, and Real Estate	Custer County	Constant at 1980 level
	Powder River County	No basic employment
	Rosebud County	No basic employment

TABLE A2-10. BASIC EMPLOYMENT ASSUMPTIONS (continued)

EMPLOYMENT SECTOR	COUNTY	BASIC EMPLOYMENT ASSUMPTIONS
Services	Custer County	Steady increase of about 1.5% annually, due to railcar maintenance and Holy Rosary Hospital
	Powder River County	Gradual decline to 1989; constant thereafter
	Rosebud County	Basically unchanged
Government	Custer County	13% increase from 1980 through 1989, due primarily to growth of Miles Community College; constant thereafter
	Powder River County	Held constant at 1980 level
	Rosebud County	57% increase from 1980 through 1985, due primarily to BN employment increases; constant thereafter

Baseline Projections

To understand the effect of the construction of the TRRC railroad and of the related actions on the region's population and employment, it first was necessary to project the area's economic and demographic characteristics unaffected by these actions. Population forecasts for the three-county region (Custer, Rosebud, Powder River) through 2010 suggest that, disregarding these actions, very little change will exist in the total population of the area after the construction of Colstrip Units 3 and 4 is completed in 1986. Region-wide, the population in 2010 would increase only 2 percent above the 1980 level. The population shifts at the county level would be more pronounced. Powder River County's population would decrease steadily from 1980 to 2010, leaving 28 percent fewer people in the county by 2010. Custer County's population would fluctuate slightly, but it also would be characterized by a dominant downward trend during the period. Rosebud County's population, however, is forecast to grow, more than offsetting the net decreases in the other two counties. After the 1986 loss of the Colstrip Units 3 and 4 construction workers, which will reduce the population to approximately the 1980 level, the county's population would grow steadily through 2010. That population at the end of the period would be 16 percent greater than it was in 1980. Table A2-11 shows the project area and county baseline population projections for each year through 2010.

TABLE A2-11

BASELINE POPULATION PROJECTIONS, 1981-2010

YEAR	REGION	CUSTER COUNTY	POWDER RIVER COUNTY	ROSEBUD COUNTY
1981	29,334	13,222	2,525	13,587
1982	31,951	13,357	2,492	16,102
1983	32,172	13,466	2,479	16,227
1984	30,854	13,472	2,417	14,965
1985	28,595	13,525	2,424	12,646
1986	27,678	13,564	2,425	11,689
1987	27,724	13,605	2,405	11,714
1988	27,845	13,641	2,395	11,809
1989	27,768	13,588	2,346	11,834
1990	27,806	13,572	2,354	11,880
1991	27,749	13,470	2,324	11,955
1992	27,688	13,374	2,293	12,021
1993	27,631	13,315	2,256	12,060
1994	27,491	13,213	2,216	12,062
1995	27,432	13,159	2,190	12,083
1996	27,292	13,020	2,154	12,118
1997	27,208	12,925	2,122	12,161
1998	27,090	12,791	2,084	12,215
1999	27,009	12,687	2,041	12,281
2000	26,941	12,608	1,986	12,347
2001	26,884	12,555	1,914	12,415
2002	26,877	12,492	1,901	12,484
2003	26,854	12,440	1,878	12,536
2004	26,877	12,399	1,870	12,608
2005	26,927	12,392	1,857	12,678
2006	27,004	12,416	1,844	12,744
2007	27,140	12,462	1,838	12,840
2008	27,280	12,517	1,825	12,938
2009	27,451	12,586	1,823	13,042
2010	27,629	12,666	1,821	13,142

The distribution of population among communities within the project area is expected to change somewhat as a result of the variable growth rates among the counties. By 2010, Rosebud is expected to be the most populous county, accounting for 47 percent of the project area population. Custer County and Powder River County are expected to decline to 45 percent and 8 percent of the project area population, respectively. At the community level, Miles City will remain the dominant center, holding over 40 percent of the project area population. The overall distribution of population by community, in 2010, is not expected to differ from the 1980 distribution by more than two or three percentage points.

The reason for the modest change in project area population is the absence of a growth in employment. Basic employment by 2010 is projected to be actually below its 1980 level by 1 percent. Total employment--i.e., basic plus nonbasic employment--may increase by less than 1 percent over the period. The structure of the area's economy also would not change significantly, particularly after Colstrip Units 3 and 4 are completed (1986). All economic sectors except agriculture are expected to grow modestly. The agricultural sector is expected to continue its historical decline in employment, dropping 18 percent by 2010 (see Table A2-12).[21] Personal income may experience only modest gains; a 2-percent growth in per capita, personal/real income is projected by 2010.

In general, then, little economic activity may occur in the project area to induce population growth. Indeed, considerable outmigration--perhaps 3,300 people by 2010--could result from economic necessity. People who will leave the project area in search of employment most likely would originate from the younger age groups. In fact, the BREAM model projects a gradual aging of the project area population. The median age is predicted to increase from 27 years (1980) to 32 years (2010). The greatest changes may occur in the school-age population (ages 5-19 years), in the 20- to 39-year-old group, and in the over-65-year-old population.

A2.1.4.2 Impacts

Population Change

The increase in employment caused by construction of the TRRC railroad and by the related actions would change the size of the project area population. Under the medium scenario, project area population in 2010 would be 22 percent higher than under the baseline case. The overall magnitude of change, however, is not expected to reach "boomtown" proportions from a project area perspective.[22] The annual compound population growth rate during the analysis period (1984-2010) is projected to be 0.7 percent under the medium scenario. This rate is below the project area growth rate from 1970-1980 (2.5 percent) and approximately equal to the population change experienced in Custer County during that period. While the population change would average under 1 percent annually, larger changes would occur during some specific years, particularly around construction periods (see Table A2-13)).

TABLE A2-12

PROJECTED EMPLOYMENT BY SECTOR, 1981-2010 BASELINE CASE

	AGRICULTURE											
YEAR	PROPRIETORS	LABOR	MINING	CONSTRUCTION	MANUFACTURING	T.C.P.U.[a]	TRADE	F.I.R.E.[b]	SERVICES	GOVERNMENT	OTHER	TOTAL
1981	799	824	531	1593	293	755	1841	247	1863	2122	1126	11,994
1982	785	813	582	2410	315	803	1916	257	1957	2245	1158	13,241
1983	772	799	588	3412	370	911	1974	267	2049	2332	1185	14,659
1984	758	788	619	3275	785	1012	1990	269	2072	2364	1191	15,123
1985	745	777	776	2155	390	1074	1954	262	2022	2326	1175	13,656
1986	732	764	798	1072	394	1123	1909	254	1962	2274	1154	12,436
1987	726	757	797	658	395	1128	1889	251	1937	2267	1146	11,951
1988	719	751	796	660	397	1138	1888	251	1935	2274	1147	11,956
1989	712	746	794	661	400	1150	1893	252	1942	2282	1151	11,983
1990	706	740	792	661	402	1160	1892	253	1936	2290	1152	11,984
1991	700	734	790	662	404	1172	1900	253	1949	2299	1156	12,019
1992	696	732	781	658	403	1183	1895	253	1946	2300	1154	12,001
1993	693	727	780	655	403	1196	1895	253	1953	2301	1155	12,011
1994	689	724	776	651	403	1209	1895	253	1961	2301	1154	12,016
1995	686	721	773	647	403	1221	1896	253	1971	2301	1154	12,026
1996	683	718	769	645	403	1233	1897	254	1981	2301	1154	12,038
1997	680	716	764	642	403	1243	1897	253	1983	2301	1154	12,036
1998	677	714	759	639	403	1255	1897	254	1987	2301	1154	12,040
1999	674	712	755	637	403	1266	1896	253	1989	2301	1153	12,039
2000	672	709	748	634	403	1276	1895	253	1990	2300	1152	12,032
2001	669	705	741	629	403	1287	1896	252	1994	2300	1152	12,028
2002	666	703	731	621	404	1297	1897	253	1999	2300	1153	12,024
2003	661	701	731	621	404	1309	1898	253	2004	2300	1153	12,035
2004	661	699	731	621	404	1319	1899	253	2009	2300	1153	12,049
2005	658	696	731	621	404	1330	1901	254	2015	2301	1153	12,064
2006	656	694	731	621	404	1340	1901	254	2020	2301	1153	12,075
2007	653	691	731	621	404	1352	1902	254	2025	2301	1153	12,087
2008	650	690	731	621	404	1363	1905	254	2032	2302	1154	12,106
2009	648	687	731	621	404	1375	1905	254	2038	2302	1154	12,119
2010	646	685	731	621	404	1306	1905	254	2044	2302	1153	12,051

[a] Transportation, Communication, and Public Utility
[b] Financial Insurance and Real Estate

TABLE A2-13

PROJECTED BASELINE AND
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO
PROJECT AREA POPULATIONS, 1981-2010[a]

YEAR	BASELINE	PROPOSED ACTION
1981	29,334	--
1982	31,951	--
1983	32,172	--
1984	30,854	30,976
1985	28,595	30,262
1986	27,678	29,862
1987	27,724	28,936
1988	27,845	28,736
1989	27,768	28,821
1990	27,806	28,958
1991	27,749	29,035
1992	27,688	29,259
1993	27,631	29,565
1994	27,491	30,817
1995	27,432	31,043
1996	27,292	30,124
1997	27,208	30,379
1998	27,090	31,783
1999	27,009	33,097
2000	26,941	32,303
2001	26,884	31,598
2002	26,877	32,148
2003	26,854	32,654
2004	26,877	33,875
2005	26,927	33,507
2006	27,004	32,686
2007	27,140	32,756
2008	27,280	32,929
2009	27,451	33,226
2010	27,629	33,734

[a] The Proposed Action population equals the baseline plus the net impact population

The low and high production scenarios would result in somewhat different population changes, relative to the medium scenario. These scenarios would result in project area population changes in 2010 of 18 percent lower and 27 percent higher than the baseline forecast, respectively (see Table A2-14). The differences among the scenarios vary throughout the analysis period primarily as a function of the

TABLE A2-14

PROJECTED PROJECT AREA IMPACT POPULATION BY SCENARIO, PROPOSED ACTION, 1984-2010

YEAR	LOW	MEDIUM	HIGH
1984	122	122	120
1985	1,666	1,666	1,674
1986	2,184	2,184	2,189
1987	1,212	1,212	1,249
1988	891	891	1,098
1989	1,053	1,053	2,594
1990	1,152	1,152	2,658
1991	1,286	1,286	1,890
1992	1,571	1,571	2,258
1993	1,841	1,934	2,583
1994	1,967	3,326	2,850
1995	3,539	3,611	4,438
1996	3,580	2,832	4,568
1997	2,772	3,171	3,909
1998	2,940	4,693	4,436
1999	3,131	6,088	7,104
2000	3,246	5,362	7,730
2001	4,592	4,714	6,163
2002	6,136	5,271	7,053
2003	5,672	5,800	7,623
2004	4,612	6,998	7,897
2005	4,269	6,580	7,820
2006	5,354	5,682	7,480
2007	5,271	5,616	7,611
2008	4,506	5,649	7,489
2009	4,715	5,775	7,545
2010	5,026	6,105	7,489

magnitude and timing of mine construction activity. For example, in 2000 the low and high scenario impact populations vary from the medium scenario by -39 percent and +44 percent, respectively. This wide range in the magnitude and timing of the impact population could create problems in planning for community development requirements.

More pronounced population changes would occur at the subregional level, since the distribution of the impact population would not be uniform among counties or among communities. Table A2-15 presents the impact population by county. All of the counties are projected to experience some growth resulting from the proposed and related actions. Rosebud County would experience the greatest share of the impact population (46 percent), followed by Powder River County (36 percent), and Custer County (18 percent). The population change projected for each

TABLE A2-15

PROJECTED IMPACT POPULATION
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010

YEAR	REGION	CUSTER COUNTY	POWDER RIVER COUNTY	ROSEBUD COUNTY
1984	122	4	52	66
1985	1,666	224	444	998
1986	2,184	453	501	1,230
1987	1,212	400	241	571
1988	891	164	276	451
1989	1,053	221	325	507
1990	1,152	223	366	563
1991	1,286	230	424	632
1992	1,571	313	515	743
1993	1,934	392	615	927
1994	3,326	462	1,102	2,062
1995	3,611	480	1,263	1,868
1996	2,832	484	977	1,371
1997	3,171	508	1,103	1,560
1998	4,693	579	1,656	2,458
1999	6,088	736	2,045	3,307
2000	5,362	746	1,838	2,778
2001	4,714	785	1,677	2,252
2002	5,271	911	1,860	2,500
2003	5,800	1,016	2,037	2,747
2004	6,998	1,086	2,506	3,406
2005	6,580	1,059	2,366	3,155
2006	5,682	951	2,061	2,670
2007	5,616	1,000	2,022	2,594
2008	5,649	1,045	2,011	2,593
2009	5,775	1,044	2,087	2,644
2010	6,105	1,094	2,220	2,791

county would be different. Custer County's population is predicted to be 9 percent over the baseline forecast in 2010. Powder River County is projected to be 122 percent, and Rosebud County 22 percent. The year-to-year fluctuations in population, by county, also would vary--with changes in Custer County being relatively more stable than the variations in either Powder River County or in Rosebud County. Table A2-16 presents the projected distribution of the impact population, by county, for the various coal production scenarios.

TABLE A2-16

PROJECTED DISTRIBUTION OF IMPACT POPULATION AMONG COUNTIES, PROPOSED ACTION, MEDIUM AND HIGH SCENARIOS, SELECTED YEARS

SCENARIO	COUNTY	PERCENTAGE OF IMPACT POPULATION BY YEAR					
		1986	1991	1996	2001	2006	2010
Medium	Custer	21	18	17	17	17	18
	Powder River	23	33	35	35	36	36
	Rosebud	56	49	48	48	47	46
High	Custer	21	15	13	15	16	16
	Powder River	23	35	35	36	36	37
	Rosebud	56	50	52	49	48	47

The differences in population growth among counties can be attributed to a series of assumptions regarding the residential location of railroad and mining employees.[23] Expectations concerning the residential location of these employees also form the basis for projecting the distribution of the impact population among communities. Table A2-17 presents population projections, by community, for the Proposed Action, with yearly percentage change calculations. Table A2-18 presents population growth data by community and scenario for the year 2010. Ashland would experience the greatest increase in its current population. Its size would become more than 250 percent of its 1980 population. Broadus is projected to experience a change similar in magnitude. During some construction years, the two communities would experience increases in population ranging from nearly 20 to 30 percent. Changes of this magnitude could pose significant social and economic problems for community residents.

Although a significant percentage of the impact population would locate in Colstrip, Forsyth, and Miles City, its net effect on the growth rates of these communities is not as remarkable. Colstrip would grow by 40 percent; Forsyth would increase by 26 percent. The variations in these two communities are unique because of the dramatic population changes they are experiencing in conjunction with the construction of Colstrip Units 3 and 4. The peak construction year for Units 3 and 4 is 1983. Colstrip would not approach its 1983 population of 7,826 at any time before 2010. Although absorbing 20 percent of the impact population, Colstrip's population in 2010 would be only 60 percent of its 1983 population. Forsyth would not regain its 1983 population level of 3,564 until 1999. In Miles City the incremental population is too small to effect more than a 5-percent growth over the analysis period.

TABLE A2-17

PROJECTED POPULATION BY LOCATION, 1983-2010
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO

	PROJECT AREA		ASHLAND[a]		BROADUS		COLSTRIP		FORSYTH		BIRNEY	
YEAR	POPULATION	% CHANGE[b]	POPULATION	% CHANGE	POPULATION	% CHANGE	POPULATION	% CHANGE	POPULATION	% CHANGE	POPULATION	% CHANGE
1983	32,172	--	1,495	--	731	--	7,826	--	3,564	--	146	--
1984	30,976	(1)	1,558	4	737	<1	6,686	(15)	3,443	(3)	152	4
1985	30,261	(2)	1,945	25	876	19	5,250	(21)	3,229	(6)	189	24
1986	29,862	(1)	2,018	4	926	5	4,570	(13)	3,111	(4)	229	21
1987	28,936	(3)	1,715	(15)	834	(10)	4,191	(8)	3,021	(3)	189	(17)
1988	28,736	(1)	1,774	3	850	2	4,145	(1)	3,008	(1)	165	(13)
1989	28,821	<1	1,808	2	857	<1	4,170	<1	3,043	1	163	(1)
1990	28,958	<1	1,847	2	875	2	4,189	<1	3,068	<1	165	<1
1991	29,035	<1	1,947	5	886	1	4,226	<1	3,086	<1	166	<1
1992	29,259	<1	2,027	4	920	4	4,276	1	3,136	2	169	2
1993	29,565	1	2,107	4	953	4	4,373	2	3,210	2	175	4
1994	30,817	4	2,571	22	1,117	7	4,812	10	3,351	4	215	23
1995	31,043	<1	2,704	5	1,182	6	4,837	<1	3,380	<1	219	2
1996	30,124	(3)	2,400	(11)	1,110	6	4,579	(5)	3,327	(2)	191	(13)
1997	30,379	<1	2,543	6	1,146	3	4,650	2	3,366	1	202	2
1998	31,783	5	3,115	22	1,317	15	5,095	10	3,502	4	251	24
1999	33,097	4	3,590	15	1,383	5	5,591	10	3,640	4	254	5
2000	32,303	(2)	3,268	(9)	1,356	(2)	5,302	(5)	3,622	(1)	225	(11)
2001	31,598	(2)	3,004	(8)	1,353	(1)	4,952	(7)	3,588	(1)	225	-0-
2002	32,148	2	2,968	(1)	1,420	5	5,055	2	3,669	2	234	4
2003	32,654	2	3,332	12	1,473	4	5,174	2	3,731	1	242	3
2004	33,875	4	3,878	16	1,587	8	5,484	6	3,788	2	291	20
2005	33,507	(1)	3,716	(4)	1,550	(2)	5,381	(2)	3,772	(1)	273	(6)
2006	32,686	(2)	3,374	(9)	1,471	(5)	5,173	(4)	3,722	(1)	238	(13)
2007	32,756	<1	3,348	(1)	1,453	(1)	5,149	(1)	3,740	<1	222	(7)
2008	32,929	1	3,348	-0-	1,448	(1)	5,163	<1	3,768	<1	222	-0-
2009	33,226	1	3,418	2	1,475	2	5,198	<1	3,805	1	223	<1
2010	33,734	2	3,545	4	1,520	3	5,276	2	3,864	2	223	-0-

[a] Includes the St. Labre community's population
[b] Percentage of change from the previous year

TABLE A2-18

PROJECTED IMPACT POPULATION AND POPULATION GROWTH BY COMMUNITY AND BY SCENARIO

COMMUNITY	IMPACT POPULATION (2010) LOW	MEDIUM	HIGH	PROJECTED TOTAL POPULATION GROWTH, 1984-2010 LOW	MEDIUM	HIGH
Ashland	1,523	1,762	2,222	136%	153%	186%
Birney	47	108	125	21	65	77
Broadus	715	909	1,064	85	112	133
Colstrip	937	1,165	1,481	(13)	(9)	(4)
Forsyth	534	689	918	17	22	29
Miles City	867	991	1,101	3	4	5
Reservation	40	47	53	58	58	59
Other	363	434	525	(13)	(11)	(9)
TOTAL	5,026	6,105	7,489			

Because some communities would achieve a disproportionate share of the impact population, the population distribution within the project area would change. The most significant variation would occur in the Ashland area, which in the year 2010 would serve as the residential location of 10 percent of the project area population. Currently that figure is approximately 5 percent. Although the percentage of the project area population residing in the Miles City locale would decrease from 40 percent to 36 percent, Miles City would remain the region's dominant urban center.

The low production and high production scenarios would differ from the medium scenario in terms of the size of the impact population and the timing of the population changes. The distribution of the impact population among subregional areas is only marginally different among scenarios. Yet, whereas the distribution of the impact population among communities varies little, the range in absolute population variation averages a decrease of 21 percent to an increase of 23 percent of the medium scenario projections. Thus, the range in Ashland's total population growth, during the 1984-2010 period, could range from 136 percent to 186 percent, depending upon the scenario. Similar range variations are expected for most communities, with the exception of Miles City and the Northern Cheyenne Indian Reservation, where ranges in population are small.

Not only would employment from the railroad and from the related actions change the size of the project area population and affect its population distribution, but it also would alter the characteristics of the population. For example, the railroad and the related actions would provide economic opportunities for those persons who otherwise would need to leave the project area in search of employment. Outmigration would be reduced, should many residents choose to remain in the area. Although differing from the baseline population's age characteristics, the impact population would not cause a significant change in the age distribution of the project area population. This finding is attributed to the fact that the impact population would represent approximately 20 percent of the project area population throughout the analysis period. The age groups for which the impact population and the baseline population differ are persons under the age of 20, persons between 35 and 44 years, and the elderly population. Eighteen percent of the impact population would range between 35 and 44 years of age in 2010, whereas in the baseline case this group would comprise only 11 percent of the total. Less than 4 percent of the impact population in 2010 would be elderly, compared with 12 percent of the baseline population at the same time. The proportion of school-age children in the impact population would be higher than that proportion in the baseline population. Persons under 20 years old would constitute 35 percent of the impact population, but only 28 percent of the baseline population, in 2010.

These variations in the characteristics of the impact population versus the baseline population would exert little effect on the region-wide age composition of the population, because the baseline population is approximately four times larger than is the impact population. Communities that are expected to experience large relative population growth individually may experience significant changes in the composition of their populations. Their populations likely would exhibit a much higher proportion of young people than they currently do--particularly during the construction years and in the early operation years. However, in a long term, overall context, the relative effect of the impact population on the region's demographics would not be significant.

Impacts to the Local Economy

Additional basic employment would be created by the construction of the proposed railroad and of the related mines. The necessary expenditures for goods and services were estimated on the basis of purchases that have been made for the construction and operation of a typical Montana strip mine, comparable in size to those mines projected for the project area.[24] That portion of the purchases that may be made within the project area was determined by evaluating the availability of the required goods and services. This assessment was effected by reviewing the project area's business composition and by interviewing the operators of local mines for information concerning the distribution of their purchases between local and nonlocal areas.[25] Tables A2-19 and A2-20 present the projected local construction and operation purchases for a hypothetical mine in the Ashland area. Representing cumulative totals, the expenditures data were distributed over time, to reflect the assumed construction and operation schedules of each mine.

TABLE A2-19

PROJECTED PROJECT AREA CONSTRUCTION EXPENDITURES
FOR A TYPICAL STRIP MINE (1972 $000s)

ITEM	CUSTER COUNTY	POWDER RIVER COUNTY	ROSEBUD COUNTY	OTHER NONLOCAL	TOTAL EXPENDITURE
Buildings	$344	$345	$345	$ 344	$ 1,376
Business Machines				11	11
Crane				208	208
Construction Equipment	124	62	62	996	1,244
Dozers				1,771	1,771
Farm Tractor				42	42
Fence	3			14	17
First Aid		3	3		6
Fresh Water		14	14		28
Furniture	6			22	28
Irrigation Equipment	3			14	17
Parking Lot	28				28
Seed Equipment				8	8
Steel				17	17
Trucks--Heavy				5,822	5,822
Trucks	87		87	175	349
Trucks--Pick-up	28		28	55	111
Tools	12	6	6	87	111
Welders				22	22
Miscellaneous	4	2	2	33	41
Other Mining Equipment				488	488
Silos	208	208	208	207	831
Silos				332	332
Shovels, Drills				383	383
TOTAL	$847	$640	$755	$11,051	$13,291

The stimulus provided by the increase in local basic employment also would induce employment in the nonbasic sectors. This type of secondary employment is that employment created in support of the basic employees and their families and in support of the new industries. About 0.4 nonbasic jobs would be created for every basic job.[26]

Without the Proposed Action and the related actions--i.e., under the baseline case--the project area may experience a stable but relatively static economy. Following the large influx of people associated with the construction of Colstrip Units 3 and 4, employment in the region would grow only slightly (see Table A2-21). Total employment--i.e., basic and nonbasic employment--may increase by less than 1

TABLE A2-20

PROJECTED PROJECT AREA OPERATING EXPENDITURES
FOR A TYPICAL STRIP MINE (1972 $000s)

ITEM	CUSTER COUNTY	POWDER RIVER COUNTY	ROSEBUD COUNTY	OTHER NON-LOCAL	TOTAL EXPENDITURE
Buildings			$ 9		$ 9
Business Machines		$ 5	4		9
Cable	$548			$ 547	1,095
Crane				188	188
Construction Equipment		2	2		4
Dozers				514	514
Farm Tractor	43			128	171
Fence				43	43
First Aid	18	9	9	50	86
Fresh Water				359	35[illegible]
Furniture				43	43
Irrigation Equipment				10	10
Parking Lot	3			14	17
Pump System				14	14
Radio				34	34
Sewage				193	193
Seed Equipment				16	16
Steel				24	24
Trucks--Heavy				200	200
Trucks				10	10
Trucks--Pick-up			12		12
Tools	31			123	154
Welders				8	8
Miscellaneous				3	3
Other Mining Equipment				2	2
TOTAL	$643	$16	$36	$2,523	$3,218

percent over the period. Basic employment alone is projected, by 2010, to be below its 1980 level by 1 percent. The structure of the area's economy would not change significantly after Units 3 and 4 are completed. All economic sectors except agriculture are expected to grow modestly. The agricultural sector is projected to continue its historical decline in employment, decreasing 18 percent by 2010.

The effect of the railroad and of the related actions would be to alter a static economy to an economy of overall, steady growth, by providing new employment in the area. The catalyst to this change is the basic employment provided by the projected mining operations and by the railroad. Basic employment--i.e., direct and indirect employ-

TABLE A2-21

EMPLOYMENT BY SECTOR, 1981-2010
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO

	AGRICULTURE											
	PROPRIETORS		LABOR		MINING		CONSTRUCTION		MANUFACTURING		T.C.P.U.[a]	
YEAR	BASELINE	PROJECTED	BASELINE	PROJECTED	BASELINE	PROJECTED	BASELINE	PROJECTED	BASELINE	PROJECTED	BASELINE	PROJECTED
1981	799	-0-	824	-0-	531	-0-	1,593	-0-	293	-0-	755	-0-
1982	785	-0-	813	-0-	582	-0-	2,410	-0-	315	-0-	803	-0-
1983	772	-0-	799	-0-	588	-0-	3,412	-0-	370	-0-	911	-0-
1984	758	-0-	788	-0-	619	21	3,275	24	785	-0-	1,012	1
1985	745	-0-	777	-0-	776	43	2,155	570	390	3	1,074	12
1986	732	-0-	764	-0-	798	132	1,072	671	394	6	1,123	15
1987	726	-0-	757	-0-	797	160	658	145	395	3	1,128	55
1988	719	-0-	751	-0-	796	190	660	7	397	2	1,138	62
1989	712	-0-	746	-0-	794	220	661	8	400	2	1,150	80
1990	706	-0-	740	-0-	792	250	661	9	402	3	1,160	81
1991	700	-0-	734	-0-	790	280	662	11	404	2	1,172	82
1992	696	-0-	732	-0-	781	335	658	13	403	3	1,183	110
1993	693	-0-	727	-0-	780	421	655	49	403	5	1,196	138
1994	689	-0-	724	-0-	776	443	651	521	403	7	1,209	147
1995	686	-0-	721	-0-	773	612	647	405	403	7	1,221	159
1996	683	-0-	718	-0-	769	655	645	22	403	6	1,233	171
1997	680	-0-	716	-0-	764	736	642	49	403	6	1,243	177
1998	677	-0-	714	-0-	759	834	639	530	403	7	1,255	188
1999	674	-0-	712	-0-	755	955	637	878	403	9	1,266	231
2000	672	-0-	709	-0-	748	1,107	634	405	403	10	1,276	247
2001	669	-0-	705	-0-	741	1,185	629	36	403	10	1,287	273
2002	666	-0-	703	-0-	731	1,320	621	40	404	12	1,297	315
2003	661	-0-	701	-0-	731	1,441	621	70	404	12	1,309	353
2004	661	-0-	699	-0-	731	1,493	621	517	404	14	1,319	361
2005	658	-0-	696	-0-	731	1,524	621	411	404	12	1,330	354
2006	656	-0-	694	-0-	731	1,525	621	45	404	12	1,340	331
2007	653	-0-	691	-0-	731	1,455	621	45	404	12	1,352	347
2008	650	-0-	690	-0-	731	1,550	621	47	404	13	1,363	365
2009	648	-0-	687	-0-	731	1,560	621	49	404	13	1,375	365
2010	646	-0-	685	-0-	731	1,660	621	52	404	13	1,306	385

[a] Transportation, Communication, and Public Utility

TABLE A2-21. EMPLOYMENT BY SECTOR, 1981-2010 (continued)

	TRADE		F.I.R.E.[a]		SERVICES		GOVERNMENT		OTHER		TOTAL[b]	
YEAR	BASELINE	PROJECTED	BASELINE	PROJECTED	BASELINE	PROJECTED	BASELINE	PROJECTED	BASELINE	PROJECTED	BASELINE	PROJECTED
1981	1,841	-0-	247	-0-	1,863	-0-	2,122	-0-	1,126	-0-	11,994	-0-
1982	1,916	-0-	257	-0-	1,957	-0-	2,245	-0-	1,158	-0-	13,241	-0-
1983	1,974	-0-	267	-0-	2,049	-0-	2,332	-0-	1,185	-0-	14,659	-0-
1984	1,990	4	269	1	2,072	4	2,364	2	1,191	2	15,123	59
1985	1,954	64	262	9	2,022	51	2,326	31	1,175	29	13,656	812
1986	1,909	87	254	12	1,962	69	2,274	42	1,154	42	12,436	1,076
1987	1,889	50	251	7	1,937	36	2,267	24	1,146	22	11,951	502
1988	1,888	40	251	5	1,935	27	2,274	18	1,147	17	11,956	368
1989	1,893	46	252	5	1,942	33	2,282	21	1,151	20	11,983	435
1990	1,892	50	253	6	1,936	36	2,290	24	1,152	21	11,984	480
1991	1,900	57	253	7	1,949	39	2,299	25	1,156	24	12,019	527
1992	1,895	73	253	9	1,946	48	2,300	31	1,154	30	12,001	652
1993	1,895	90	253	11	1,953	62	2,301	40	1,155	37	12,011	853
1994	1,895	133	253	18	1,961	104	2,301	69	1,154	57	12,016	1,499
1995	1,896	149	253	19	1,971	115	2,301	76	1,154	54	12,026	1,596
1996	1,897	127	254	15	1,981	92	2.301	61	1,154	54	12,038	1,203
1997	1,897	140	253	18	1,983	104	2,301	69	1,154	60	12,036	1,359
1998	1,897	191	254	25	1,987	152	2,301	110	1,154	83	12,040	2,120
1999	1,896	244	253	32	1,989	198	2,301	130	1,153	106	12,039	2,783
2000	1,895	232	253	30	1,990	182	2,300	118	1,152	100	12,032	2,431
2001	1,896	219	252	27	1,994	164	2,300	107	1,152	94	12,028	2,115
2002	1,897	260	253	33	1,999	189	2,300	124	1,153	109	12,024	2,402
2003	1,898	281	253	34	2,004	202	2,300	132	1,153	117	12,035	2,642
2004	1,899	325	253	41	2,009	244	2,300	159	1,153	137	12,049	3,291
2005	1,901	298	254	39	2,015	244	2,301	155	1,153	130	12,064	3,167
2006	1,901	280	254	35	2,020	208	2,301	136	1,153	118	12,075	2,690
2007	1,902	283	254	35	2,025	206	2,301	134	1,153	119	12,087	2,626
2008	1,905	290	254	36	2,032	211	2,302	138	1,154	122	12,106	2,772
2009	1,905	298	254	37	2,038	219	2,302	143	1,154	126	12,119	2,810
2010	1,905	315	254	38	2,044	232	2,302	152	1,153	133	12,051	2,980

[a] Financial, Insurance, and Real Estate
[b] Total of columns from both pages of table

ment--would have several components: (1) railroad construction and operation; (2) mining construction and operation; (3) direct supplying of goods and services to the railroad and the mining companies. The magnitude and timing of these various components of basic employment would directly influence the nature of the economic changes that would occur in the region. The project area's basic employment would increase by 25 percent during the project period. A corresponding increase in nonbasic employment would occur as well. Overall, employment in the area would increase by almost 3,000 jobs, an increase of roughly 25 percent over the baseline projection.

Demand for Services

The impact population attributed to the proposed TRRC railroad and to the related mines would increase the demand for local services. These increased demands would occur principally in the fields of housing and public facilities.

Housing

Those periodic peaks in the housing demand that result from temporary construction employment are overtaken several years later by the permanent labor force's steadily increasing housing demand. Unlike the situation in "boomtowns," housing to meet the needs of the temporary construction population can be provided with the expectation that there would be a long term market for that housing. The generally steady increase in the impact population indicates that the orderly development of housing would be feasible. The patterns of demand by type of housing would vary with the nature of the need. A recent study of Colstrip's housing demand found the following distribution of demand by housing type (see Table A2-22).[27]

TABLE A2-22

EXAMPLE DISTRIBUTION OF DEMAND BY HOUSING TYPE

HOUSING TYPE	PERMANENT WORK FORCE	TEMPORARY WORK FORCE
Permanent single-family units	55%	27%
Mobile homes	32%	47%
Other (multifamily dwellings or dormitories and motels)	13%	26%

The estimates of the housing requirements for the TRRC railroad and for the related actions were based, in part, on the preferences exhibited above. These estimates involved several assumptions:[28]

(1) Single-family, detached dwellings: 4 units per acre
(2) Mobile homes: 8 units per acre
(3) Multifamily dwellings: 17 units per acre

(4) Average household size: 2.8 persons--the 1980 average for the region

These assumptions were translated into the following factors to develop an estimate of housing requirements for the impact population:[29]

(1) Total housing demand per 100 population: 35.5 units
(2) Distribution of demand: single family - 19.5
mobile homes - 11.4
other - 4.6

The housing needs generated in this manner for the medium production scenario are presented in Table A2-23. Over the forecast period, a substantial and growing demand would exist for single-family dwellings, as well as for mobile homes. The number of required units would continue to increase after the construction period, indicating the long term nature of the demand.

TABLE A2-23

ESTIMATED HOUSING REQUIREMENTS
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, SELECTED YEARS

YEAR	SINGLE FAMILY	MOBILE HOMES	OTHER	TOTAL
1984	24	14	5	43
1985	325	190	76	591
1986	426	249	100	775
1987	236	138	56	430
1988	174	102	40	316
1989	205	120	49	374
1990	225	131	53	409
1991	251	147	59	457
1996	552	323	130	1,005
2001	919	537	217	1,673
2006	1,108	648	261	2,017
2010	1,190	696	281	2,167

By 2010, the housing needs of the impact population would reach 21 percent of the current housing supply--as determined by the 1980 census--which represents an annual growth rate of less than 1 percent. This magnitude of growth is less than that amount experienced in the project area during the past decade.[30] This finding indicates that, whereas short term housing problems would occur (particularly land shortages, housing shortages, and inflation), in the long term, the local housing industry should be able to satisfy the housing demand.

The distribution of the housing demand, by community, is comparable to the distribution of the impact population. The effect of the impact population on the local housing market would vary according to the characteristics of each community. After the peak construction year for Colstrip Units 3 and 4 (1983), when construction workers begin to leave the area, both Colstrip and Forsyth would develop a surplus supply of housing. Although the two communities might experience some short term problems in providing housing, in the long term, they should encounter little difficulty in absorbing their share of the impact population's housing demand. Since the project-related population growth in the Miles City area appears to be gradual, and sufficiently small in relation to the existing population, any new construction required to meet the increased housing demand can be provided in new subdivisions. In the Ashland area and in Broadus, both of which would experience large population increases, the demand for new housing would be more critical and could cause short term planning problems.

The housing demand would vary by scenario, according to the changes in the impact population. Although it may be difficult to provide housing during peak construction periods under the medium production scenario, the provision of housing under the low scenario should be more manageable. Under the high production scenario, the difficulties involved in satisfying the housing demand would be more pronounced.

Public Facilities

The impact population would require additional public services and public facilities. The requirements for public facilities were estimated according to the governmental jurisdiction responsible for providing them. The following facilities were considered by designated jurisdiction:

Region:	Hospitals Mental health facilities Social service special homes Elderly-care facilities Nursing homes	
County:	Police protection Ambulance service Solid waste disposal Fire protection Parks and recreation Public office/library space County shop facilities Streets and roads	
Community:	Water services Sewer services Fire protection	Solid waste disposal Streets and roads

School District: Elementary schools
High schools

The method applied to estimate facility service requirements involved the development of several demand factors that, when multiplied by the projected impact population, yielded a series of projected facility requirements.[31] These requirements then were compared to the existing facility capacities and to the baseline population demand to yield the projected expansion needs. The demand factors were based upon those standards developed for communities experiencing energy development and upon the existing service levels provided in the project area. Table A2-24 lists these demand factors. The facility requirements were estimated annually from 1984 through 1991, and thereafter at 5-year intervals through 2010. For the 5-year intervals, the impact population figure used to represent the population during the intervals was selected according to the following criteria:[32]

(1) If, during the 5-year period, the impact population increased or decreased steadily, the impact population in the fifth year was designated to represent the trend.
(2) If the impact population fluctuated within the 5-year period, a population figure generally representing the midpoint of the fluctuation was designated.

The current facility capacity data were obtained from secondary sources and then verified by interviews with service providers and with government officials in the project area. Two types of facilities were distinguished: those facilities that are fixed over a long term period, such as buildings and streets; those facilities that are variable in the short term, such as vehicles and other equipment. In the case of major facilities, the existing capacity explicitly was considered in determining the possible expansion requirements. For variable facilities and for facilities that can be expanded in relatively small increments (e.g., office space, some parks and recreation areas, police and fire stations), existing facilities were assumed to be currently at capacity.

The timing of each facility expansion was determined by the size of the capacity shortfall in any given year, by the increase in additional capacity requirements over time, and by a series of assumptions regarding the ease with which that facility could be expanded. If a local student population was projected to increase steadily during a 10-year or 15-year period, and existing facilities already were at capacity, it was assumed that the facility expansion required to provide for this population during the period would occur at the beginning of the period. On the other hand, each facility expansion necessary to provide for a short term increase in demand, which would be followed by a period of lesser growth or of a decline in demand, was timed to correspond to the short term demand requirements. For variable capital investments, such as vehicles and equipment, the expansion was assumed to occur in the same year as would the increase in demand for the pertinent public service.

TABLE A2-24

FACILITY DEMAND FACTORS

SERVICE AREA	POPULATION BASIS	FACTOR
Elementary Schools		
Square-feet Schools	per student	90
Acres	per student	.03
Secondary Schools		
Square-feet Schools	per student	123
Acres	per student	.04
Water Supply		
Acre-feet/year capacity	per 100 population	22
Gallons/day capacity	per 100 population	20,000
Acres	per 100 population	.01
Sewage		
Gallons/day treatment cap.	per 100 population	10,000
Acres	per 100 population	.1
Police		
Vehicles	per 100 population	.07
Square-feet Facilities	per 100 population	21
Acres	per 100 population	.006
Fire Protection		
Vehicles	per 100 population	.077
Square-feet Facilities	per 100 population	21
Acres	per 100 population	.01
Medical		
Hospital Beds	per 100 population	.4
Square-feet Hospitals	per 100 population	272
Acres	per 100 population	.025
Solid Waste		
Acres-landfill	per 100 population	.005
Cubic-yards/year	per 100 population	260
Transfer Vehicle (Ashland)	per 100 population	.02
Transfer Vehicle (Forsyth)	per 100 population	.002

Table A2-25 presents those findings pertaining to the facility requirements for the Proposed Action/medium coal production scenario. Few facilities would require any substantial expansion during the analysis period (1984-2010). This finding is based upon the population decline that will follow the completion of construction at Colstrip Units 3 and 4. That population decline will provide existing and recently constructed facilities for the impact population. Further, the increase in population, and thus, in the demand for expanded facilities, would not be significant, relative to the baseline, in most areas. As a result of these factors, the only major facilities that would require expansion by 1991 would be the school in Ashland and project area parks and recreation facilities. Most of the neces-

TABLE A2-25

FACILITIES NEEDS
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010

ROSEBUD COUNTY	1984-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2010	TOTAL
Schools							
Elementary District #3							
Elementary District #4							
Elementary District #19							
Elementary District #32J	4,500 sq. ft.		7,020 sq. ft.	14,580 sq. ft.			26,100 sq. ft.
High School District #4							
High School District #19							
Colstrip							
Water treatment							
Sewage treatment							
Solid waste							
Fire vehicles--purchase	1 vehicle						1 vehicle
replacement					1 vehicle		1 vehicle
Fire station	140 sq. ft.			190 sq. ft.			330 sq. ft.
Forsyth							
Water treatment							
Sewage treatment							
Fire vehicles--purchase					1 vehicle		1 vehicle
Fire station					150 sq. ft.		150 sq. ft.
County services							
Police vehicles--purchase	1 vehicle			1 vehicle			2 vehicles
replacement		1 vehicle	1 vehicle	1 vehicle	2 vehicles	2 vehicles	7 vehicles
Police facilities	260 sq. ft.		460 sq. ft.				720 sq. ft.
Office/library space			5,790 sq. ft.				5,790 sq. ft.
Ambulances--purchase				1 vehicle			1 vehicle
replacement						1 vehicle	1 vehicle
County shop			2,400 sq. ft.				2,400 sq. ft.
Parks & recreation land	12 acres		7 acres	15 acres			34 acres
-recreation area	1 rec. area		1 rec. area	1 rec. area			3 rec. areas
-tennis court			1 tennis court				1 tennis court
-softball field				1 softball field			1 softball field
Ashland area water treatment				53,900 gpd			53,900 gpd
Ashland area sewage treatment							
Ashland area fire vehicles				1 vehicle			1 vehicle
Ashland area fire station				200 sq. ft.			200 sq. ft.
Lagoon acres				0.5 acre			0.5 acre
Highway upgrading			6.6 miles		16.6 miles		23.2 miles
County							
State highways					1.1 miles		1.1 miles

TABLE A2-25. FACILITIES NEEDS, PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO (continued)

	1984-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2010	TOTAL
CUSTER COUNTY							
Schools							
Elementary District #1		5,040 sq. ft.					5,040 sq. ft.
Custer County High School							
Miles City							
Water treatment							
Sewage treatment							
Solid waste	.05 acre						.05 acre
Fire vehicles--purchase				1 vehicle			1 vehicle
Fire station				210 sq. ft.			210 sq. ft.
County services							
Police vehicles--purchase				1 vehicle			1 vehicle
replacement					1 vehicle	1 vehicle	2 vehicles
Police facilities					230 sq. ft.		230 sq. ft.
Ambulances							
Office/library space				1,860 sq. ft.			1,860 sq. ft.
County shop				770 sq. ft.			770 sq. ft.
Parks & recreation land	5 acres			6 acres			11 acres
-recreation area				1 rec. area			1 rec. area
Highway upgrading							
POWDER RIVER COUNTY							
Schools							
Elementary District #79J				1,350 sq. ft.	1,890 sq. ft.		3,240 sq. ft.
Powder River County High School							
Broadus							
Water treatment					47,400 gpd		47,400 gpd
Sewage treatment					8,700 gpd		8,700 gpd
Solid waste							
Shop facilities			680 sq. ft.				680 sq. ft.
County services							
Police vehicles--purchase			1 vehicle		1 vehicle		2 vehicles
replacement				1 vehicle	1 vehicle	2 vehicle	4 vehicles
Police facilities			530 sq. ft.				530 sq. ft.

TABLE A2-25. FACILITIES NEEDS, PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO (continued)

POWDER RIVER COUNTY	1984-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2010	TOTAL
Fire vehicles			1 vehicle	1 vehicle			2 vehicles
Fire station			530 sq. ft.				530 sq. ft.
Office/library space	850 sq. ft.		3,410 sq. ft.				4,260 sq. ft.
Ambulances							
County shop	350 sq. ft.		1,400 sq. ft.				1,750 sq. ft.
Parks & recreation land	5 acres		20 acres				25 acres
-recreation area			1 rec. area	1 rec. area	1 rec. area		3 rec. areas
-tennis court				1 tennis court			1 tennis court
					1 softball field		1 softball field
Ashland area water treatment	50,800 gpd		69,800 gpd	123,800 gpd			244,400 gpd
Ashland area sewage treatment	25,400 gpd		34,900 gpd	61,900 gpd			122,200 gpd
Ashland area fire vehicles				1 vehicle			1 vehicle
Ashland area fire station				260 sq. ft.			260 sq. ft.
Lagoon acres	0.3 acre		0.3 acre	0.6 acre			1.2 acres
Highway upgrading							
County				6.2 miles			6.2 miles
State					3.7 miles		3.7 miles
REGION							
Hospital beds			28 beds				28 beds
Hospital facilities			19,000 sq. ft.				19,000 sq. ft.
Mental health			12 spaces				12 spaces
Social service homes	1 home			1 home			2 homes
Elderly long term care				14 beds			14 beds
Elderly intermediate care				6 beds			6 beds
Elderly nursing home				8,000 sq. ft.			8,000 sq. ft.

sary facility expansion is projected to occur between 1992 and 2001, the time period during which the impact population will increase more rapidly.

Because facility requirements are a function of population change, they would vary by coal production scenario. The basic differences among the facility requirements for the three scenarios reflect the differences in the timing and in the magnitude of the impact population. The facilities for the low production scenario are approximately 17 percent less than for the medium scenario. Practically all of the major capital facilities designated for expansion under the medium production scenario also would require expansion under the low scenario--excluding the water system in Broadus, which could serve the total demand population under the low scenario. The facility expansion for the low production scenario would be less and would be required later than that expansion projected for the medium scenario.

Table A2-26 presents the expansion requirements associated with the high production scenario. For variable facilities, additions are approximately 25 percent greater under the high scenario than they are under the medium scenario. For the former scenario, the major facility expansions are projected to be required earlier and to last longer. With the exceptions of the Powder River High School, the Broadus Elementary School, and the Broadus sewage treatment plant, no differences would exist between the magnitude of facility expansion under the medium production scenario and the high scenario.

Fiscal Impacts

The projected public facilities requirements, already presented, provide the basis for estimating the costs of those capital improvements that state and local governments may incur as a result of the TRRC railroad and of the related mines. Operation and maintenance costs also were estimated using per capita expenditure rates for each jurisdiction. After the costs of the required public services and public facilities were estimated, they were compared to the estimates of the revenues projected to accrue to both state and local governments. Such comparisons established the net fiscal effect of the Proposed Action and of the related actions. These comparisons were determined on an annual basis from 1984 to 1991 and, after 1991, were made for every fifth year through 2010. The comparisons also were ascertained by jurisdiction--primarily involving county governments and city governments, and school districts, which are expected to experience the greatest changes in revenue receipts and/or in expenditure requirements. Revenues that may accrue to the state government and selected expenditures that may be required of the state government also were examined, but in less detail.[33]

Public fiscal impact analyses were performed for Custer County, Powder River County, and Rosebud County, as well as for Broadus, Forsyth, and Miles City. Since Ashland, Birney, and Colstrip are unincorporated, the costs of public services for these communities are

TABLE A2-26

FACILITIES NEEDS
PROPOSED ACTION/HIGH PRODUCTION SCENARIO, 1984-2010

ROSEBUD COUNTY	1984-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2010	TOTAL
Schools							
Elementary District #3							
Elementary District #4	3,150 sq. ft.	1,530 sq. ft.					4,680 sq. ft.
Elementary District #19							
Elementary District #32J	3,960 sq. ft.	5,490 sq. ft.	9,180 sq. ft.	12,870 sq. ft.			31,500 sq. ft.
High School District #4							
High School District #19							
Colstrip							
Water treatment							
Sewage treatment							
Solid waste							
Fire vehicles--purchase		1 vehicle					1 vehicle
replacement						1 vehicle	1 vehicle
Fire station		390 sq. ft.					390 sq. ft.
Forsyth							
Water treatment							
Sewage treatment							
Fire vehicles--purchase				1 vehicle			1 vehicle
Fire station				200 sq. ft.			200 sq. ft.
County services							
Police vehicles--purchase	1 vehicle		1 vehicle	1 vehicle			3 vehicles
replacement		1 vehicle	1 vehicle	2 vehicles	3 vehicles	3 vehicles	10 vehicles
Police facilities	260 sq. ft.		600 sq. ft.				860 sq. ft.
Office/library space	2,100 sq. ft.		4,850 sq. ft.				6,950 sq. ft.
Ambulances--purchase				1 vehicle			1 vehicle
replacement						1 vehicle	1 vehicle
County shop	865 sq. ft.		1,995 sq. ft.				2,860 sq. ft.
Parks & recreation land	12 acres		11 acres	18 acres			41 acres
-recreation area	1 rec. area		1 rec. area	2 rec. areas			4 rec. areas
-tennis court			1 tennis court	1 tennis court			2 tennis courts
-softball field				1 softball field			1 softball field
Ashland area water treatment				69,200 gpd			69,200 gpd
Ashland area sewage treatment			61,500 gpd				61,500 gpd
Lagoon acres			0.6 acre				0.6 acre
Highway upgrading							
County			6.6 miles	16.6 miles			23.2 miles
State				1.6 miles			1.6 miles

TABLE A2-26. FACILITIES NEEDS, PROPOSED ACTION/HIGH PRODUCTION SCENARIO (continued)

	1984-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2010	TOTAL
CUSTER COUNTY							
Schools							
Elementary District #1		6,480 sq. ft.					6,480 sq. ft.
Custer County High School							
Miles City							
Water treatment							
Sewage treatment							
Solid waste	.06 acre						.06 acre
Fire vehicles--purchase				1 vehicle			1 vehicle
Fire station				250 sq. ft.			250 sq. ft.
County services							
Police vehicles--purchase				1 vehicle			1 vehicle
replacement					1 vehicle	1 vehicle	2 vehicles
Police facilities				270 sq. ft.			270 sq. ft.
Ambulances							
Office/library space	770 sq. ft.			1,420 sq. ft.			2,190 sq. ft.
County shop	320 sq. ft.			590 sq. ft.			910 sq. ft.
Parks & recreation land	5 acres			8 acres			13 acres
-recreation area					1 rec. area		1 rec. area
Highway upgrading							
County							
State							
POWDER RIVER COUNTY							
Schools							
Elementary District #79J			8,550 sq. ft.				8,550 sq. ft.
Powder River County High School				3,940 sq. ft.			3,940 sq. ft.
Broadus							
Water treatment				75,000 gpd			75,000 gpd
Sewage treatment				22,500 gpd			22,500 gpd
Solid waste							
Shop facilities			770 sq. ft.				770 sq. ft.
County services							
Police vehicles--purchase			1 vehicle	1 vehicle			2 vehicles
replacement				1 vehicle	2 vehicle	2 vehicle	5 vehicles
Police facilities			600 sq. ft.				600 sq. ft.

TABLE A2-26. FACILITIES NEEDS, PROPOSED ACTION/HIGH PRODUCTION SCENARIO (continued)

POWDER RIVER COUNTY	1984-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2010	TOTAL
Fire vehicles--purchase		1 vehicle		1 vehicle			2 vehicles
replacement						1 vehicle	1 vehicle
Fire station		600 sq. ft.					600 sq. ft.
Office/library space	850 sq. ft.		4,020 sq. ft.				4,870 sq. ft.
Ambulances--purchase				1 vehicle			1 vehicle
replacement						1 vehicle	1 vehicle
County shop	350 sq. ft.		1,660 sq. ft.				2,010 sq. ft.
Parks & recreation land	5 acres		24 acres				29 acres
-recreation area			1 rec. area	1 rec. area	1 rec. area		3 rec. areas
-tennis court				1 tennis court			1 tennis court
-softball field					1 softball field		1 softball field
Ashland area water treatment	100,000 gpd		181,000 gpd				281,000 gpd
Ashland area sewage treatment	50,000 gpd		90,500 gpd				140,500 gpd
Lagoon acres	0.5 acre		0.9 acre				1.4 acres
Highway upgrading							
County				6.2 miles			6.2 miles
State					17.8 miles		17.8 miles
REGION							
Hospital beds			30 beds				30 beds
Hospital facilities			20,000 sq. ft.				20,000 sq. ft.
Mental health			13 spaces				13 spaces
Social service homes	1 home			1 home			2 homes
Elderly long term care				20 beds			20 beds
Elderly intermediate care				7 beds			7 beds
Elderly nursing home				11,000 sq. ft.			11,000 sq. ft.

included in the respective Rosebud County and Powder River County fiscal analyses.[34]

Local Government Expenditure Requirements

The analysis of expenditure requirements included a determination of the potential changes in local government-operating costs. An estimate of the per capita cost of public services was developed, based upon the actual expenditures for the fiscal years 1978 through 1980, and upon the budgeted expenditures for the fiscal year 1981. The applicable information was obtained from budget reports, by jurisdiction, and from communications with city clerks and county clerks.[35] Those jurisdictional budget items that would vary with any increases in population were identified.[36] Then an annual expenditure, by item, was determined.[37] The summation of expenditure estimates for all budget items, divided by current population, resulted in the per capita operation-and-maintenance expenditure used to estimate future local government operation and maintenance costs. Based upon these per capita operation and maintenance cost estimates and upon the net impact population projections, an estimate was made of the amount of additional operating costs and maintenance costs that would be incurred by local governments, as a result of the proposed railroad and of the related mines. These estimates, by jurisdiction, for the Proposed Action/medium production scenario are presented in Table A2-27.

TABLE A2-27

PROJECTED ADDITIONAL LOCAL GOVERNMENT OPERATION AND MAINTENANCE COSTS
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010 ($000)

	COUNTIES			CITIES		
YEAR	CUSTER	POWDER RIVER	ROSEBUD	BROADUS	FORSYTH	MILES CITY
1984	$ <1	$ 37	$ 18	$ 2	$ 1	$ <1
1985	28	315	284	21	18	23
1986	59	356	351	27	23	44
1987	52	171	163	15	12	41
1988	21	196	129	17	8	18
1989	29	231	144	20	11	25
1990	29	260	160	22	13	25
1991	30	301	180	25	13	24
1996	63	637	391	62	36	54
2001	102	1,191	642	105	63	88
2006	124	1,463	761	124	75	107
2010	142	1,576	795	132	79	124
CUMULATIVE[a] TOTALS	$2,159	$24,559	$14,006	$2,030	$1,244	$1,845

[a] Includes the entire analysis period

The analysis of expenditure requirements also included the projection of local government capital costs, by jurisdiction, which were derived from the estimated public facilities requirements, using unit costs corresponding to the various facility types. Separate unit costs for land and for capital improvements also were developed for this analysis. Typical per acre land costs were determined for Ashland, Broadus, Colstrip, Forsyth, and Miles City. The land costs, by location, further were divided into five categories:

(1) Improved land within the city limits or the community limits, used for residential purposes;
(2) Improved land within the city limits or the community limits, applied to commercial and industrial purposes;
(3) Improved land within the city limits or the community limits, used for institutional purposes;
(4) Unimproved land adjacent to the city limits or the community limits;
(5) Rural land.

The resultant land cost estimates, based on land cost data obtained from individuals familiar with the project area's real estate market, are presented in Table A2-28.[38] These estimates address each class of land, by location. The unit costs then were multiplied by the respective acreage requirements, by year, to derive the land costs that may be incurred by the local governments.

TABLE A2-28

LAND COST ESTIMATES PER ACRE[a]

LAND TYPE CLASSIFICATION	MILES CITY	FORSYTH	COLSTRIP	BROADUS	ASHLAND
Improved land within the city or community limits--residential	$ 70,000	$55,000	$53,000	$33,000	$19,000
Improved land within the city or community limits--commercial/industrial	$135,000	$68,000	$72,000	$44,000	$19,000
Improved land within the city or community limits--institutional	$102,500	$61,500	$62,500	$35,500	$19,000
Unimproved land adjacent to the city or community limits	$ 2,100	$ 3,000	$ 3,900	$ 5,500	$ 3,000
Rural land	$ 240	$ 240	$ 240	$ 240	$ 240

[a] All costs are given in 1981 dollars

Capital improvement costs were divided into three categories for estimation purposes: (1) construction costs, including labor, equipment, and materials; (2) furnishings; (3) major equipment acquisitions, not provided for in the operation and maintenance cost estimates. The construction costs and the furnishings' costs were developed from estimates provided by several architectural and engineering firms serving the project area.[39] Average unit costs, by type of structure, also were determined.

Typically the midpoint in the range of costs provided was selected for use in the analysis. The unit costs then were adjusted to include mobilization/demobilization costs and architectural and site development costs (see Table A2-29). The estimates of the cost to furnish the facilities are 15 percent of the construction costs.[40] Table A2-29 also presents the unit costs for equipment that may be required. The primary equipment costs would entail the purchases of fire vehicles, police cars, ambulances, and solid waste collection and transfer vehicles.

The unit capital cost factors were applied to the projected facility and equipment requirements to derive the estimated capital costs, by jurisdiction. Table A2-30 presents the incidence of capital costs, including land costs, projected to be incurred by each jurisdiction for the Proposed Action/medium production scenario impact population.

School District Expenditure Requirements

The school districts listed below are projected to experience the greatest population effects of the Proposed Action and of the related actions. These districts were included in the analyses of the operation-and-maintenance cost requirements and of the capital cost requirements. (See Table A2-31 for the projected school-age impact population for each of these districts.)

(1) High School District No. CCDHS (Custer County District High School), Custer County
(2) High School District No. 79J, Powder River County
(3) High School District No. 4, Forsyth
(4) High School District No. 19, Colstrip
(5) Elementary School District No. 1, Miles City
(6) Elementary School District No. 3, Birney
(7) Elementary School District No. 4, Forsyth
(8) Elementary School District No. 19, Colstrip
(9) Elementary School District No. 32J, Ashland
(10) Elementary School District No. 79J, Broadus

The operation and maintenance costs were derived from estimated per student costs, by school district, which were developed from historical expenditure rates, inflated to February, 1981, levels. The highest expenditure rate, experienced by jurisdiction within the last 3 years, was selected to determine the future school district operation costs and maintenance costs. By multiplying the per student

TABLE A2-29

CAPITAL AND EQUIPMENT COST ESTIMATES[a]

ITEM	UNIT COST
Elementary schools	$80/sq. ft.
Secondary schools	$80/sq. ft.
Police stations	$115/sq. ft.[b]
Fire stations	$85/sq. ft.
Hospitals	$150/sq. ft.
Libraries	$80/sq. ft.
Library books	$10/volume
Streets/roads	$65/lineal foot[c]
Medical clinics	$80/sq. ft.
Social service facilities	$80/sq. ft.
Nursing/rest homes	$80/sq. ft.
Administration buildings	$80/sq. ft.
County shops	$40/sq. ft.
Recreation area	$80,000 each
Tennis court	$15,000 each
Softball field	$175,000 each
Ambulances	$32,500/ambulance
Fire vehicles	$75,000/pumper
Police vehicles	$14,000/patrol car
Solid waste collection vehicles (for transfer stations)	$70,000/truck
Water system (Ashland & Broadus)	$1.50/gal.
Sewer system (Ashland & Broadus)	$1.80/gal.

[a] Costs are expressed in 1981 dollars and are based on costs typical in a remote rural area, e.g., Ashland. Costs include architecture fees, site development expenses, and furnishings costs; 15 percent was added to the construction costs to account for furnishings costs

[b] Includes detention facilities

[c] Assumes a 36-foot, paved street, with curbs and gutters and a sidewalk on one side of the street; the street width is consistent with model subdivision regulations promulgated by the Montana Department of Community Affairs, January, 1980

operation-and-maintenance cost factor by the projected student impact population, an estimate was derived for the operating costs and for the maintenance costs that may be incurred by each school district. The estimated costs, by school district, are presented in Table A2-32.

To translate the facility requirements into capital costs, unit land costs and unit facility costs were developed. The derivation of those unit costs is addressed in the preceding discussion regarding local government expenditure requirements. The resultant cost esti-

TABLE A2-30

PROJECTED LOCAL GOVERNMENT CAPITAL COSTS RELATED TO THE PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000)

	COUNTIES			CITIES			
TIME PERIOD	CUSTER COUNTY	POWDER RIVER COUNTY	ROSEBUD COUNTY	BROADUS	FORSYTH	MILES CITY	TOTAL
1984		49					49
1985	11	49	171				231
1986		159	87				246
1987							
1988							
1989							
1990			14				14
1991							
1992-1996		866	699	27			1,592
1997-2001	314	576	707	71		93	1,761
2002-2006	14	283	103	16	188		604
2007-2010	14	28	61				103
TOTAL	353	2,010	1,842	114	188	93	4,600

mates, by school district, are presented in Table A2-33 for the Proposed Action/medium production scenario.

State Government Expenditure Requirements

State expenditure requirements are expected to increase by $1.0 million to $9.0 million annually, as a result of the construction of the TRRC railroad and the related mines. In addition, state highway maintenance costs and construction costs may increase to $16.8 million during the 1984-2010 period, under the Proposed Action/medium production scenario. (See the Transportation section, A3.0, for the derivation of the highway costs.)

Tax Revenue Projections

The procedure used to estimate the potential tax revenue from the proposed railroad and from the related mines was composed of the following steps:

TABLE A2-31

SCHOOL-AGE IMPACT POPULATION, BY DISTRICT
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010

	HIGH SCHOOL DISTRICTS[a]				ELEMENTARY SCHOOL DISTRICTS[b]					
YEAR	CUSTER COUNTY	POWDER RIVER COUNTY	NO. 4 FORSYTH	NO. 19 COLSTRIP	NO. 1 MILES CITY	NO. 3 BIRNEY	NO. 4 FORSYTH	NO. 19 COLSTRIP	NO. 32J ASHLAND	NO. 79J BROADUS
1984	-0-	2	1	2	1	-0-	3	5	5	3
1985	12	19	10	37	35	5	33	90	55	35
1986	28	29	16	69	64	15	70	126	101	56
1987	24	14	7	21	59	10	35	54	37	29
1988	10	16	5	20	28	3	22	44	43	33
1989	13	19	8	21	37	3	27	47	50	39
1990	14	22	9	23	37	6	29	47	57	45
1991	13	26	9	26	35	5	29	52	60	50
1996	30	63	22	60	77	12	65	109	135	114
2001	50	110	35	97	134	17	106	170	222	185
2006	63	142	45	122	163	17	111	192	264	208
2010	77	153	44	122	181	16	108	187	274	210

[a] Includes that population in the 15-through-18-years age cohort
[b] Includes that population in the 5-through-14-years age cohort

TABLE A2-32

PROJECTED OPERATION AND MAINTENANCE COSTS, BY SCHOOL DISTRICT,
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010
($000)

YEAR	HIGH SCHOOL DISTRICTS[a] CUSTER COUNTY	POWDER RIVER COUNTY	NO. 4 FORSYTH	NO. 19 COLSTRIP	ELEMENTARY SCHOOL DISTRICTS[b] NO. 1 MILES CITY	NO. 3 BIRNEY	NO. 4 FORSYTH	NO. 19 COLSTRIP	NO. 32J ASHLAND	NO. 79J BROADUS
1984	$ --	$ 9	$ 3	$ 9	$ 2	$ --	$ 6	$ 15	$ 13	$ 8
1985	32	89	35	168	82	17	66	265	15	95
1986	75	136	55	313	150	52	140	372	27	15
1987	64	66	24	95	139	35	70	159	99	78
1988	27	75	17	91	66	10	44	130	115	89
1989	35	89	28	95	87	10	54	139	134	105
1990	38	103	31	104	87	21	58	139	153	122
1991	35	122	31	118	82	17	58	153	161	135
1996	80	296	76	272	181	42	130	321	362	308
2001	134	517	124	471	315	70	213	501	596	500
2006	169	667	155	553	383	70	223	566	709	563
2010	207	719	152	553	425	56	217	551	736	568
CUMULATIVE[c] TOTALS	$2,867	$10,284	$2,549	$9,495	$6,498	$1,161	$4,225	$10,796	$11,927	$9,457

[a] Based on that population in the 15-through-18-years age cohort
[b] Based on that population in the 5-through-14-years age cohort
[c] For entire analysis period

TABLE A2-33

PROJECTED SCHOOL DISTRICT CAPITAL REQUIREMENTS
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO (1981 $000)

SCHOOL DISTRICT	YEARS REQUIRED	LAND	FACILITIES	TOTAL
No. 1, Miles City Elementary	1989-1990	$ 4	$ 403	$ 407
No. 32J--Ashland Elementary	1985-1986; 1992-2001	$26	$2,088	$2,114
No. 79J--Broadus Elementary	1997-2006	$ 6	$ 259	$ 265

(1) Tax revenues were estimated by tax source and by taxing jurisdiction;

(2) Interjurisdictional revenue transfers were estimated. Tax revenues estimated to accrue to each jurisdiction, by tax sources, were summed to derive an estimate of total revenue by jurisdiction.

Table A2-34 presents the primary revenue sources, by jurisdiction. Tax liabilities then were assessed for each category, using the various coal production scenarios and applying data obtained from the Montana Department of Revenue and from local jurisdictions.[41] Several of the state revenues already are reserved, in part, for the school foundation program. The sources of all revenue include the corporate property and license taxes, the personal income tax, the coal severance tax, the resource indemnity tax, the personal property tax, and other miscellaneous taxes.[42] Because the dispensing of these revenues does not follow any established formula, those state revenues available to school districts were not distributed to local governments. Therefore, the disbursements of state revenues to local governments were not estimated.

Revenue receipts associated with the TRRC railroad and with the related mines are presented in Table A2-35, by jurisdiction, for the Proposed Action/medium production scenario.

Fiscal Impact Analysis

The fiscal impact analysis focuses on the net fiscal balance, by years, projected for each jurisdiction. The total revenues that would accrue to the state and local governments would greatly exceed the increased government costs associated with the proposed railroad and with the related mines. The potential problems, or net fiscal deficits, that would occur would be a function of the differences in the

TABLE A2-34

PRIMARY TAX REVENUE SOURCES, BY TAXING JURISDICTION

TAX SOURCE	TAXING JURISDICTION STATE	COUNTY	CITY	SCHOOL DISTRICT
Corporate Property Tax	x	x	x	x
Corporate License Tax	x			
Personal Property Tax	x	x	x	x
Personal Income Tax	x			
Coal Severance Tax	x			
Resource Indemnity Tax	x			
State Royalty Tax	x			
Highway User's Tax	x	x		
Miscellaneous Taxes	x	x	x	

incidence of costs versus revenues, during the analysis period and among jurisdictions.

At the state level, a net fiscal surplus would result almost immediately. In two years, net fiscal deficits of approximately $0.5 million may be experienced, but by 1988, a net fiscal surplus of at least $4.5 million would result. Beyond 1988, that net fiscal surplus would increase, reaching more than $80 million in 2010. A cumulative surplus of $1,078 million could accrue to the state during the entire analysis period (see Table A2-36).

At the regional level, tax revenues accruing to all project area jurisdictions would be more than sufficient to meet the projected public services' costs for every year during the analysis period (see Table A2-37). However, revenues and costs would not be distributed evenly among jurisdictions. Whereas some local jurisdictions would receive revenues several times greater than the costs they would incur, other jurisdictions would experience substantial revenue shortfalls for certain periods of time--primarily during the first 10 to 15 years. After 1995, the number of jurisdictions incurring net fiscal deficits would decline. Six of the 16 jurisdictions analyzed would experience net fiscal deficits throughout the analysis period (see Tables A2-38 through A2-40).

Local Impacts: Counties

Rosebud County would receive sufficient public revenues to meet all of the impact-related public service needs incurred at the county level. A significant portion of the railroad and the first mine scheduled to enter production are located in that county. County revenues

TABLE A2-35

PROJECTED TAX REVENUE RECEIPTS, BY JURISDICTION
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000s)

JURISDICTION	TAX REVENUE RECEIPTS BY YEARS											
	1985	1986	1987	1988	1989	1990	1991	1996	2001	2006	2010	CUMULATIVE TOTAL
State	$ 242	$2,873	$5,395	$ 9,672	$14,247	$14,534	$14 620	$36,272	$60,252	$ 75,684	$ 91,665	$1,256,055
Counties:												
Custer	432	909	895	937	927	884	895	948	1,011	1,069	1,075	24,930
Powder River	--	6	49	54	26	30	104	1,017	3,573	7,570	9,344	42,859
Rosebud	390	989	1,166	1,391	1,556	1,933	2,321	3,877	3,956	5,049	3,098	82,459
Cities:												
Broadus	--	2	19	23	13	15	17	44	79	114	111	1,512
Forsyth	--	1	16	31	16	12	18	40	63	92	102	1,360
Miles City	66	66	90	113	108	85	91	113	143	182	188	3,344
Elementary School Districts:												
Miles City #1	197	282	313	353	345	304	315	358	411	477	488	9,899
Birney #3	90	181	190	189	190	189	207	253	1,754	1,178	210	21,701
Forsyth #4	--	1	22	41	23	17	25	51	87	127	140	1,870
Other S.D.	--	2	2	--	--	1	1	3	5	5	5	114
Colstrip #19	--	1	24	30	13	11	11	25	150	652	1,007	6,408
Ashland #32J	180	514	660	857	1,042	1,796	1,826	3,049	2,645	5,342	7,282	78,272
Broadus #79J	--	2	39	28	15	16	20	51	91	130	127	1,867
Other S.D.	3	11	7	1	2	2	2	4	6	9	11	161
High School Districts:												
Custer	349	731	702	719	715	697	702	731	763	787	791	19,074
Powder River	--	1	9	10	5	6	17	39	470	1,020	1,426	11,128
Forsyth #4	--	1	8	14	8	6	9	18	30	44	49	647
Other H.S.	--	1	1	--	--	--	--	1	2	2	2	34
Colstrip	60	154	182	220	249	307	378	636	635	818	496	13,589
TOTAL	$2,009	$6,728	$9,789	$14,683	$19,500	$20,845	$21,579	$47,530	$76,126	$100,351	$117,617	$1,577,283

TABLE A2-36

PROJECTED STATE NET FISCAL BALANCE
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000s)

YEAR	COSTS	REVENUES[a]	NET FISCAL BALANCE
1984	$ 180	$ --	$ (180)
1985	2,456	242	(2,214)
1986	3,219	2,873	(346)
1987	2,386	5,395	3,009
1988	1,913	9,672	7,759
1989	2,152	14,247	12,095
1990	2,298	14,534	13,236
1991	1,896	14,620	12,724
1996	4,774	36,272	31,498
2001	9,648	60,252	50,604
2006	10,775	75,684	64,909
2010	11,399	91,655	80,256
CUMULATIVE TOTAL[b]	$178,007	$1,256,055	$1,078,048

a Excludes railroad income tax payments, because they could not be determined
b Includes entire analysis period

TABLE A2-37

PROJECTED REVENUES AND COSTS, ALL JURISDICTIONS[a]
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000)

YEAR	REVENUES	COSTS	NET FISCAL BALANCE
1984	$ --	$ 174	$ (174)
1985	1,767	2,098	(331)
1986	3,852	3,003	849
1987	4,391	1,283	3,108
1988	5,011	1,053	3,958
1989	5,253	1,439	3,814
1990	6,310	1,582	4,728
1991	6,958	1,472	5,486
1996	11,254	4,308	6,946
2001	15,867	6,180	9,787
2006	24,660	6,874	17,786
2010	25,945	7,051	18,894
CUMULATIVE TOTAL[b]	$321,080	$122,172	$198,908

a Revenues and costs exclude State of Montana and "Other School Districts"
b Includes entire analysis period

TABLE A2-38

PROJECTED NET FISCAL BALANCE, BY JURISDICTION, IN CUSTER COUNTY[a]
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000s)

YEAR	COUNTY	MILES CITY	GOVERNMENT SUBTOTAL	CUSTER CO. HIGH SCHOOL	ELEM #1	SCHOOLS SUBTOTAL	TOTAL
1984	$ (0.5)	$ (0.5)	$ (1)	$ --	$ (2)	$ (2)	$ (3)
1985	393	43	436	317	115	432	868
1986	850	22	872	656	132	788	1,660
1987	843	49	892	638	174	812	1,704
1988	916	95	1,011	692	287	979	1,990
1989	898	83	981	680	55	735	1,716
1990	855	60	915	659	14	673	1,588
1991	865	67	932	667	233	900	1,832
1996	885	59	944	651	177	828	1,772
2001	846	36	882	629	96	725	1,607
2006	942	75	1,017	616	94	710	1,727
2010	930	64	994	584	63	647	1,641
CUMULATIVE[b] TOTAL	$22,419	$1,406	$23,825	$16,207	$2,995	$19,202	$43,027

[a] Excludes "Other School Districts"
[b] Includes entire analysis period

County revenues never would become less than 150 percent of county costs. During the analysis period, those revenues would reach 400 percent of the estimated public service and public facility demands of the impact population. At current tax rates, a cumulative project-related surplus of approximately $66 million would accrue to Rosebud County by 2010.

Custer County, in which much of the rail line would be located, would receive revenues in excess of its public service costs, beginning during the first year of railroad construction (1985). Throughout the analysis period, county revenues would exceed county costs by an annual average of more than 800 percent. A net revenue surplus of more than $22 million would accrue to Custer County.

Powder River County is projected to experience a deficit in the short term, despite the expectation that the county's projected revenues would exceed its costs by $16 million during the entire analysis period. A net deficit of approximately $1.8 million would be experienced between 1984 and 1991, with the worst year resulting in a per capita revenue shortfall of approximately $145.00. The average,

TABLE A2-39

PROJECTED NET FISCAL BALANCE, BY JURISDICTION, IN POWDER RIVER COUNTY
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000s)

YEAR	COUNTY	BROADUS	GOVERNMENT SUBTOTAL	POWDER RIVER HIGH SCHOOL	ELEM. #79J	SCHOOLS SUBTOTAL	TOTAL
1984	$ (66)	$ (2)	$ (68)	$ (9)	$ (8)	$ (17)	$ (85)
1985	(364)	(21)	(385)	(89)	(95)	(184)	(569)
1986	(509)	(25)	(534)	(135)	(149)	(284)	(818)
1987	(122)	4	(118)	(57)	(39)	(96)	(214)
1988	(142)	6	(136)	(65)	(61)	(126)	(262)
1989	(205)	(7)	(212)	(84)	(90)	(174)	(386)
1990	(230)	(7)	(237)	(97)	(106)	(203)	(440)
1991	(197)	(8)	(205)	(105)	(115)	(220)	(425)
1996	206	(23)	183	(257)	(252)	(509)	(326)
2001	2,267	(40)	2,227	(47)	(432)	(479)	1,748
2006	6,050	(13)	6,037	353	(464)	(111)	5,926
2010	7,762	(21)	7,741	707	(441)	266	8,007
CUMULATIVE[a] TOTAL	$16,290	$(633)	$15,657	$844	$(7,855)	$(7,011)	$8,664

[a] Includes entire analysis period

annual, per capita shortfall for the period between 1984 and 1991 would be $84.

Local Impacts: Cities

Fiscal projections associated with the impact population differ among the three project area cities--Broadus, Forsyth, and Miles City (see Table A2-41). Broadus is projected to experience net fiscal deficits throughout the analysis period. Its additional revenues would exceed its additional costs during a few years, and its costs during the entire analysis period are projected to exceed revenues by 25 percent. To recoup the deficit would require an increase in the average, annual, per capita tax payment of roughly $19. The single worst year for the city would require an additional per capita tax payment of $25.

Forsyth also would experience net fiscal deficits through the period, thereby requiring an increase in tax payments. Miles City would receive property tax payments from the TRRC that would exceed its impact costs in all years.

TABLE A2-40

PROJECTED NET FISCAL BALANCE, BY JURISDICTION, IN ROSEBUD COUNTY[a]
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000s)

YEAR	COUNTY	FORSYTH	GOVERNMENT SUBTOTAL	HS #4	HS #19	ELEM #3	ELEM #4	ELEM #19	ELEM #32J	SCHOOLS SUBTOTAL	TOTAL
1984	(19)	(1)	(20)	(3)	(9)	-0-	(6)	(15)	(13)	(46)	(66)
1985	(65)	(18)	(83)	(35)	(108)	73	(66)	(265)	(150)	(551)	(634)
1986	551	(22)	529	(54)	(159)	129	(139)	(371)	61	(533)	(4)
1987	1,003	4	1,007	(16)	87	155	(48)	(135)	561	604	1,611
1988	1,262	23	1,285	(3)	129	179	(3)	(100)	742	944	2,229
1989	1,412	5	1,417	(20)	154	180	(31)	(126)	908	1,065	2,482
1990	1,759	1	1,760	(25)	203	168	(41)	(128)	1,643	1,820	3,580
1991	2,141	5	2,146	(22)	260	190	(33)	(142)	1,665	1,918	4,064
1996	3,346	4	3,350	(58)	364	211	(79)	(296)	2,573	2,715	6,065
2001	3,173	0	3,173	(90)	164	1,684	(126)	(349)	1,813	3,096	6,269
2006	4,253	(20)	4,233	(111)	265	1,108	(96)	86	4,633	5,885	10,118
2010	2,290	23	2,313	(103)	(67)	154	(77)	456	6,546	6,909	9,222
CUMULATIVE[b] TOTAL	66,610	(73)	66,537	(1,902)	4,094	20,540	(2,355)	(4,388)	64,231	80,220	146,757

[a] Excludes "Other School Districts," elementary and high school.
[b] Includes entire analysis period

TABLE A2-41

PROJECTED NET FISCAL BALANCE, BY JURISDICTION
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO, 1984-1991 and 1984-2010

JURISDICTION	CUMULATIVE REVENUE SURPLUS (DEFICIT) ($000) 1984-1991	1984-2010	PER CAPITA CHANGE IN ANNUAL AVERAGE REVENUE REQUIREMENT ($) 1984-1991	1984-2010
Custer County				
County	$ 5,620	$ 22,419	$ (51.00)	$ (59.00)
Miles City	419	1,406	(4.00)	(4.00)
County H.S.	4,309	16,207	(39.00)	(43.00)
Miles City Elem.	1,008	2,995	(9.00)	(8.00)
TOTAL	$11,356	$ 43,027		
Powder River County				
County	$(1,835)	$ 16,290	$ 84.00	$ 265.00
Broadus	(60)	(633)	9.00	19.00
Broadus Elem.	(663)	(7,855)	97.00	234.00
County H.S.	(641)	844	30.00	(14.00)
TOTAL	$(3,199)	$ 8,646		
Rosebud County				
County	$11,390	$ 66,610	$ (11.00)	$ (191.00)
Forsyth	1	(73)	<(1.00)	<1.00
Ashland Elem.	7,990	64,231	(547.00)	(841.00)
Birney Elem.	1,285	20,540	(906.00)	(3,461.00)
Colstrip Elem.	(1,578)	(4,388)	35.00	32.00
Colstrip H.S.	921	4,094	(20.00)	(30.00)
Forsyth Elem.	(446)	(2,355)	18.00	24.00
Forsyth H.S.	(236)	(1,902)	9.00	19.00
TOTAL	$19,327	$146,757		

Local Impacts: School Districts

Those school districts that are projected to consistently experience net fiscal deficits throughout the period are Broadus Elementary (#79), Colstrip Elementary (#19), Forsyth Elementary (#4), and Forsyth High School (see Table A2-41). The Broadus Elementary School District would experience the largest net fiscal deficit. This cumulative deficit would reach $7.8 million by 2010, reflecting an annual average deficit of $260,000. In per capita terms, the deficit would average approximately $234.00 annually. The projected deficits for the other school districts range from $1.9 million to $4.3 million for the analysis period. The average annual per capita deficits are:

(1) Broadus Elementary - $234
(2) Colstrip Elementary - $32
(3) Forsyth Elementary - $24
(4) Forsyth High School - $19

On the other hand, revenues are projected to exceed costs in the following school districts (in millions of 1981 dollars):

(1) Ashland Elementary - $64
(2) Custer County High School - $16
(3) Birney Elementary - $21
(4) Colstrip High School - $4
(5) Miles City Elementary - $3
(6) Powder River High School - $1

The Ashland Elementary School District and the Colstrip High School District would experience short term deficits, which would occur only in a few, isolated years. Although the Powder River High School District would experience a long term net fiscal surplus, it also would experience short term deficits. Its annual revenues would not exceed its costs until 2000. Through 1991, its cumulative deficit would reach approximately $641,000, or almost $30 per capita annually. The 27-year, incremental revenues-to-cost ratio for these six school districts range from 1.1 to 15.8.

Taxpayers

Table A2-41 also summarizes the net fiscal impact projections, by juisdiction, for the 1984-1991 and 1984-2011 periods. The data distinguish those jurisdictions that would experience fiscal hardships. From a public fiscal perspective, the residents of Custer County and Miles City would benefit overall from the Proposed Action and from the related actions, as would the residents of Rosebud County. The residents of Powder River County--particularly the residents of Broadus--would experience the largest adverse fiscal impact. Broadus residents may encounter in excess of a $200 annual, per capita increase in their tax liabilities for city government and school district services. This impact occurs because a significant portion of the impact population is assumed to locate in Broadus, but Broadus would not benefit directly from either the railroad company's or the mining companies' property tax payments. In the long term, Powder River County residents would benefit from a large fiscal surplus.

High and Low Production Scenario Public Fiscal Impacts

The relative patterns of net fiscal impact, by jurisdiction, under the high production and low production scenarios would reflect the same characteristics as those patterns projected for the medium scenario. With the exception of the first strip mine, the timing of the mine openings and the annual volume of coal produced would vary by scenario. Thus, the resultant corporate property and business tax revenues also would vary. The different production schedules primarily would affect the net fiscal impact experienced by taxing jurisdictions in Powder River County. Under the high-production scenario, the cashflow problems of the Powder River County jurisdictions would be eliminated 5 years earlier than they would be under the medium production scenario. Under the low coal production scenario, cashflow problems would be eliminated 1 year later than under the medium scenario.

Mitigative Measures

The imbalance among jurisdictions regarding net fiscal balance suggests that a primary means to mitigate adverse fiscal impacts would be to establish a procedure for sharing revenues. The functions of such a procedure would be: (1) to mitigate, through the subject period, the imbalance of revenues and costs among jurisdictions; (2) to redistribute the large surpluses experienced by some jurisdictions to those jurisdictions projected to incur deficits. For example, part of Rosebud County's surpluses could be transferred to Forsyth to eliminate its projected cashflow problems. Less than 0.5 percent of the county's cumulative excess revenues would be required for this use. Through revenue sharing, the combined school jurisdictions in Rosebud County would attain greater income than costs in every year of the analysis period.

Another measure to mitigate the adverse fiscal impacts is the disbursement of state revenues, such as coal severance tax revenues, that are designed to assist those areas experiencing energy development.

Sociological Impacts: Effects on Lifestyle

Current residents in the project area are concerned that sociological problems associated with rapid growth--or "boomtown" environments --could result from the construction of the TRRC railroad and of the related mines. They express concern that crime, spouse abuse, child abuse, alcohol and drug abuse, juvenile delinquency, teenage pregnancy, mental stress, marital stress, and infant mortality would increase.[43] The concern also exists that the current residents' political power would erode, and that they would be ruled by the decisions of newcomers, who advocate totally different value systems.

Literature addressing "boomtowns" was researched in an attempt to define possible "boomtown" impacts.[44] Based on that research, the following factors were identified as possessing possible relationships to sociological change:

(1) Rapid population growth--in excess of 10 percent annually;[45]
(2) Short term increases in the transient population;

(3) Inadequate public services and public facilities; inadequate goods and services, particularly housing;
(4) Inadequate resources--both institutional and financial--to manage rapid growth;
(5) Attitudes of the local residents regarding growth;
(6) Conflicts between values held by local residents and by newcomers;
(7) Inadequate institutions for social interaction.

Project Area Sociological Impacts

On a project area-wide basis, the changes in population associated with the proposed railroad and with the related mines could be absorbed without appreciable sociological disruption. The projected annual rate of growth for the study area is 0.7 percent during the analysis period. Not only is this growth rate comparable to that increase experienced by Custer County and Miles City during the last decade, but it is also considerably less than the 10-percent annual growth rate associated with "boomtowns." Following the time period that includes the construction of Colstrip Units 3 and 4 (1980-1983), the largest single-year change in project area population is [illegible] percent in 1994.

Community Sociological Impacts

The impact population would not be distributed uniformly within the project area. The majority of it would be located in Ashland, Birney, Broadus, Colstrip, Forsyth, and Miles City. The growth rates of these communities and their capabilities to manage that growth would vary. The degree of sociological problems experienced by each community also would vary.

The annual growth rate for Ashland, the community projected to experience the most significant growth, would range from 3 percent to 4 percent by 2010. As shown in Table A2-17, the other impacted communities would experience lesser growth rates. Yet, with resident populations in 2010 more than double their 1980 populations, Ashland, Birney, and Broadus would be very different places than they are today. For example, Ashland is projected to have, by 2010, a population about equal to the 1980 population of Colstrip.

Moreover, when the population projected for the various communities is considered on a year-to-year basis, a different picture emerges. Table A2-17 presents the annual percentage changes in population projected for the communities that are expected to attract the majority of the impact population. The data reveal that Ashland, Birney, and Broadus would experience population changes in excess of 10 percent in several specific years.

Colstrip and Forsyth would experience population increases of 10 percent or more in some years. Prior to 1987, these changes are attributable to the construction of Colstrip Units 3 and 4. The Proposed Action and the related actions will lessen the population fluctuations that Colstrip and Forsyth otherwise would experience. In addition to the smaller population variations for Colstrip and Forsyth--in comparison with Ashland--these two communities are better equipped to manage growth without significant sociological disturbance, for the following reasons:

(1) The two communities will have experienced residential development and public facilities construction undertaken for Colstrip Units 3 and 4;
(2) Rosebud County would accrue net revenue surpluses;
(3) The composition of the populations in the two communities--and especially in Colstrip--is similar in character to the projected impact population.

Colstrip and Forsyth would possess resources and institutions to manage the projected growth. Containing populations similar to the impact population would facilitate the integration of the impact population into the communities, because fewer value conflicts between local people and newcomers would exist.

Ashland, a small, agricultural community, would experience larger population growth rates than either Colstrip or Forsyth and would possess few institutions to manage that growth. Exacerbating the growth problem is the division of the Ashland area into two counties. Whereas the net fiscal balance projected for the Ashland Elementary School District is positive, Powder River County--which would be responsible for many of the services required in the Ashland area--is projected to experience large fiscal deficits through the early 1990s. Only after 1993 would Powder River County accumulate large net fiscal balance surpluses. Since Ashland would experience growth rates that periodically approach "boomtown" levels, sociological problems similar in nature, if not in magnitude, to those problems experienced in other "boomtowns" are inevitable--particularly during construction periods. In the long term, Ashland's sociological character would change more dramatically than the character of any other community. The underlying, steady growth projected for Ashland would mitigate its transition to a larger community, but that growth would not deter the basic change in lifestyle and in value systems that would occur.

Ashland has no formal group to provide for the demands of an increased population and to coordinate plans with coal companies and state agencies. In addition, the community is made up of many small social groups that seldom interact, making it difficult for the community to reach a consensus. The lack of institutions to handle growth and the lack of community cohesiveness would hamper Ashland's ability to absorb the predicted population increases. The sociological problems mentioned earlier could confront the community. The people of Ashland could experience a fundamental change in their lifestyle. They might find that their privacy had been interfered with, that their values conflict with the newcomers' values and interests, that their families are subject to stress, and that the political process within their community has become more formal. In addition, the development of the railroad and coal mines could mean the removal of economic power from the community when land use and employment decisions are made by coal industry officials outside of the local area. Ashland would feel the growing presence of government, as well. The stratification within the community would increase when coal development increases the status of some, while lowering that of others. Women and the elderly would be most affected, since most mine workers are male and under 60 years of age.[46]

Broadus and Birney also would experience "boomtown" growth rates during several years. Birney, like Ashland, is ill-equipped to deal with this growth. However, Broadus is better equipped socially and institutionally than is Ashland to absorb that population growth. On the other hand, Broadus would incur net fiscal deficits as a result of impact population growth.

Because sociological change is primarily a function of the magnitude and the timing of population change, the sociological problems confronted by these communities would vary by scenario. Under the high production scenario, population growth would be greater--by 23 percent during the analysis period--and would occur sooner than it would under the medium scenario. This growth would exacerbate the sociological problems experienced by the communities, particularly Ashland. Under the low production scenario, the opposite situation would occur, because the population changes are smaller (by 21 percent) and would occur later than they would under the medium scenario. An exception would occur during some mine construction years, in which the low production scenario population would exceed the medium scenario population.

<u>Economic and Social Opportunities</u>

Construction of the TRRC railroad and the related mines would generate new, direct and indirect employment opportunities.[47] This growth in employment also would change the economic forecast for the area from a relatively static economy to a growth economy. This development could be significant to that portion of the local population that, under the baseline case, is projected to leave the project area because of economic necessity. Personal income related to the TRRC railroad and to the related mines also would be higher than the baseline's personal income figures, suggesting that an overall increase in the local standard of living could occur. The population growth and the personal income growth would mean that a greater diversity of goods and services would be available in the project area and that the choice of lifestyles would be more diverse.

Mitigative Measures

The anticipation of service supply problems and the provision of requisite service expansions by mining companies and public agencies would help to mitigate those conditions contributing to potential sociological problems. In addition to improving the living arrangements for the impact population, the public agencies and private firms could enhance social services in an effort to assist local residents and newcomers to confront and to resolve the social problems that they would encounter. Such social services include preventive measures, such as the provision of activities for social recreation. Services such as employment counseling and job training also could assist local residents in taking advantage of employment opportunities.

A2.1.4.3 Impacts to the Northern Cheyenne Indian Reservation

The impacts that primarily concern members of the Northern Cheyenne tribe are those that would result from the construction and operation of coal mines, developed because of the presence of the Tongue River Railroad.[48]

Population

Without the development of the Montco Mine and the other mines associated with the railroad, the population of the reservation would expand 1.1 percent annually, resulting in a 2010 population of 3,702 persons, which is 40 percent larger than the 1980 population of 2,651. As a result of cumulative development, 72 persons would be added to the 2010 population, increasing the 2010 population by 2 percent and accounting for 1.9 percent of the reservation's population during that year.[49]

Employment and Impacts to the Local Economy

Fifteen percent of the work force of the mines are projected to be Northern Cheyenne Indians living on the reservation. In addition, some Northern Cheyenne would be employed in off-reservation, secondary development. The most noticeable impact would be a small decrease in the reservation's unemployment rate. Mining would become more important to the Northern Cheyenne economy, and the tie between the Northern Cheyenne and private business would increase. The earnings of Northern Cheyenne mine workers would result in a greater reliance on a cash economy.[50]

Demand for Services

The Northern Cheyenne are concerned that mine development would increase the demand for community services that are presently overextended. Although non-Indians moving into the area because of mine development would not locate on the reservation, the increase in the Indian population over the life of the mines would be substantial and in itself strain services. Additional burdens placed on the minimal services existent on the reservation--i.e., emergency medical services, retail facilities, and schools--are of concern.[51]

Fiscal Impacts

Without a significant population increase on the reservation from the coal development, the fiscal demands on tribal resources should not increase significantly.[52]

Sociological Impacts

The areas of the reservation that would be most impacted by mine development are those that lie nearest the mine sites and those that would be crossed by mine workers on their way to and from the mines. Economic development could facilitate the Northern Cheyenne's assimilation into mainstream American society. However, the absorption into non-Indian society might be unwanted and costly. The Northern Cheyenne themselves express concern over increased cross-cultural contact and its repercussions.[53]

The Northern Cheyenne are concerned that conflict with non-Indians and among themselves would increase, because of the changing values and lifestyles of those employed at the mines. An increased reliance on a cash economy and increased exposure to other values indirectly could decrease the incidence of communal living, making the conveyance of Cheyenne customs and language more difficult. The further disintegration of Northern Cheyenne culture is a concern of many Northern Cheyenne.[54]

Conflict also could arise with the proximity of non-Indian mine workers and from workers commuting across the reservation. Increased contact could result in more intermarriage and would intensify competition in social activities. More interaction with non-Indians might promote social problems within Indian families due to the concern for the deterioration of Northern Cheyenne culture. An additional concern of the Northern Cheyenne is that coal development would exacerbate alcoholism and drug abuse, considered by the Northern Cheyenne as the most serious social problem on the reservation.[55]

The magnitude of these impacts on the Northern Cheyenne is unknown. However, in the case of the Birney district, it is anticipated that impact brought about by the Montco Mine, without any mitigative measures, could seriously impact the sense of family and community cohesion that apparently has maintained and characterized the Birney district as traditionally Cheyenne. A concern is expressed that cultural change would have the greatest impact on the elders and the young.[56]

Recreation

The Northern Cheyenne express concern for the impact that the newcomers would have on recreation. The use of reservation recreation resources might increase when mine workers settle nearby and commute across the reservation from Colstrip. Recreational facilities are not adequate to meet the needs of current area residents. Increased use would deteriorate the qualities of picnicking, fishing, and solitude enjoyed by users of the tribal recreation areas. The Northern Cheyenne are concerned that problems with garbage disposal, roads, maintenance of picnic and parking areas, personal safety, and sanitation facilities would occur.[57]

A2.2 TONGUE RIVER ROAD ALTERNATIVE

The construction of a railroad along the Tongue River Road alternative route would be similar to construction along the proposed alignment. Construction employment would vary slightly for this alternative--averaging 230 workers each month during the construction season. Forty percent of the work force is expected to be local, and 60 percent would be of nonlocal origin.

A railroad on the Tongue River Road alternative route would serve the same mines in the Ashland/Birney area as would the proposed railroad. Operation and maintenance of the railroad, as a function of the construction and operation of the mines, would not differ from that described for the Proposed Action.

Population change, impacts to the local economy, demand for services, fiscal impacts, and sociological impacts were examined for the Tongue River Road alternative in the same manner as for the proposed railroad. Given the similarity in development of the routes, the impact findings discussed for the Proposed Action can be applied to the Tongue River Road alternative.

A2.3 MOON CREEK ALTERNATIVE

The construction of a railroad along the Moon Creek alternative route would be similar to construction along proposed alignment. Construction employment would vary slightly for this alternative--averaging between 240 and 260 workers each month. Forty percent of the work force is expected to be local, and 60 percent would be of nonlocal origin.

A railroad on the Moon Creek alternative route would serve the same mines in the Ashland/Birney area as would the proposed railroad. Operation and maintenance of the railroad, as a function of the construction and operation of the mines, would not differ from that described for the Proposed Action.

Population change, impacts to the local economy, demand for services, fiscal impacts, and sociological impacts were examined for the Moon Creek alternative in the same manner as for the proposed railroad. Given the similarity in development of the routes, the impact findings discussed for the Proposed Action can be applied to the Moon Creek alternative.

A2.4 COLSTRIP ALTERNATIVE

A2.4.1 Construction

The construction of the Colstrip alternative would occur in much the same manner as the proposed alignment. Total construction employment would be lower for the Colstrip route due to the shorter length of the route. It is assumed that 40 percent of the construction workers would be of local origin and 60 percent of nonlocal origin.

A2.4.1.1 Impacts to the Local Economy

Construction requirements--labor and materials--for the Colstrip alternative generally would be 35 percent less than those for the proposed railroad (see Table A2-42). The rise in personal income would be about 8 percent less for this alternative than for the proposed railroad. Ma··imum employment due to construction of the Colstrip alternative would reach 358 persons during the peak of activity.

TABLE A2-42

PROJECTED RAILROAD CONSTRUCTION EXPENDITURES
BY LOCATION OF EXPENDITURE, COLSTRIP ALTERNATIVE

ITEM	PROJECT AREA	BILLINGS	OTHER	TOTAL
Right-of-way Fencing	$ 460,258	$ 51,117	--	$ 511,375
Major Structures	566,991	110,775	1,482,701	2,160,467
Ballast	--	--	5,021,522	5,021,522
Sub-ballast	273,652	--	--	273,652
Rail	--	4,833,585	4,833,585	8,667,170
Equipment	3,357,236	7,919,616	12,101,156	23,378,008
TOTALS	$ 4,658,137	$12,915,093	$23,438,964	$41,012,194

Fiscal Impacts

Fiscal impacts for the Colstrip alternative would vary somewhat from those for the proposed rail line. The net fiscal balance for the construction of the Colstrip alternative amounts to a surplus of approximately $5 million. Under the Colstrip alternative, Forsyth, Miles City, and the Forsyth School Districts would experience (like the Proposed Action) net fiscal deficits. In absolute terms the deficits would not be appreciably different than under the Proposed

Action. In addition, Custer County, Miles City Elementary School District, and Custer County High School District would experience deficits.

Demand for Services

Construction of the Colstrip alternative would cause somewhat different service demands than the proposed railroad. The difference can be attributed to the smaller size of the construction work force and impact population associated with the former route. Those nonlocal workers not residing in the construction work camps would not be located in Miles City, as assumed for the proposed rail line, but in Colstrip. The end of construction on Colstrip Units 3 and 4 should make housing more available for construction workers and thereby would lessen somewhat the temporary impacts.

A2.4.2 Operation and Maintenance

The work force to operate and maintain a railroad along the Colstrip alternative would be very similar to that depicted in the employment table for the Proposed Action (see Table A2-5). For this alternative, however, it was assumed that most railroad personnel would be located in Colstrip and that the demand for services and other sociological impacts would primarily be concentrated in that area.

Impacts to the Local Economy

Total employment associated with the operation and maintenance of the Colstrip alternative route is presented in Table A2-43. By providing new employment to the project area, the effect of the railroad and the related actions would be to change the economy from a relatively stagnant one to a growth economy. The magnitude and timing of the various components of basic employment (direct and indirect) would directly influence the nature of economic (and demographic) changes that would occur.

Potential Industrial Development Due to the Availability of Rail Service

The discussion of industrial development due to the operation and maintenance of the proposed railroad can be applied to a railroad along the Colstrip alternative route.

Changes in the Tax Base

Most of the discussion of changes in the tax base attributed to the Proposed Action can be applied to the discussion of tax base changes for the Colstrip Alternative. The isolated cases that might experience devaluation in the Miles City area under the proposed rail line would not be impacted by the Colstrip Alternative.

TABLE A2-43

TOTAL EMPLOYMENT DUE TO RAILROAD OPERATION AND MAINTENANCE OF THE COLSTRIP ALTERNATIVE

YEAR	BASIC DIRECT	BASIC INDIRECT EMPLOYMENT	OTHER NONBASIC	TOTAL EMPLOYMENT
1987	30	20	16	66
1988	33	27	18	78
1991	38	64	25	127
1996	64	97	53	214
2001	92	162	83	337
2006	109	201	102	412
2010	129	240	118	487

A2.4.3 Downline Impacts

The construction and the operation of a railroad on the Colstrip alternative route would not affect downline social and economic patterns.

A2.4.4 Related Actions

A railroad operating on the route of the Colstrip alternative would serve the same mines in the Ashland/Birney area as would the proposed TRRC railroad. Social and economic impacts from the Colstrip Alternative and from the related actions were analyzed using the same methods employed in the proposed rail line assessment. Baseline assumptions and population projections can be applied to both the proposed rail line and the Colstrip alternative.

A2.4.4.1 Impacts

Population Change

The impact population for the Colstrip Alternative/medium production scenario would vary slightly from that for the proposed rail line. By the year 2010, an estimated 5,786 persons might reside in the study area under the Colstrip alternative, as opposed to 6,105 persons under the proposed rail line (see Table A2-44).

While the total impact population for this alternative route would not change substantially from the proposed rail line, the distribution of population would differ. With the Colstrip alternative, it was assumed that TRRC offices and train crews would be located in Colstrip. The net effect of this difference is a shifting of impact population from Miles City to Colstrip and Forsyth (see Table A2-45).

TABLE A2-44

PROJECTED IMPACT POPULATION, BY LOCATION
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO

YEAR	REGION	MILES CITY	CUSTER COUNTY (TOTAL)	POWDER RIVER COUNTY (TOTAL)	COLSTRIP	FORSYTH	ROSEBUD COUNTY (TOTAL)
1986	1,618	209	237	223	620	60	1,158
1991	1,366	55	69	481	376	180	816
1996	2,872	126	144	985	771	465	1,743
2001	4,605	225	247	1,614	1,164	754	2,744
2006	5,524	288	310	1,944	1,411	910	3,270
2010	5,786	236	261	2,220	1,433	960	3,305

TABLE A2-45

ALLOCATION OF PROJECTED IMPACT POPULATION AMONG PROJECT AREA
COMMUNITIES, COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO

	POPULATION BY YEAR					
COMMUNITY	1986	1991	1996	2001	2006	2010
Ashland[a]	201	452	815	1,295	1,558	1,762
Birney	17	29	64	95	112	108
Broadus	88	186	418	689	813	909
Colstrip	620	376	771	1,164	1,411	1,433
Forsyth	60	180	465	754	910	960
Lame Deer	2	8	17	26	27	28
Miles City	209	55	126	225	288	236
Other Project Area	421	80	196	357	405	350
TOTAL	1,618	1,366	2,872	4,605	5,524	5,786

[a] Includes those portions of Ashland in Powder River County, Rosebud County, and those individuals residing at St. Labre Mission

Under the Colstrip alternative, many of the railroad employees who otherwise would locate in the Miles City area are assumed to locate in Forsyth and Colstrip. If this occurred, under the medium production scenario, Rosebud County would have 25 percent more of the impact population by 2010 than it would under the proposed rail line; Colstrip and Forsyth would have 30 and 45 percent larger impact populations, respectively. Custer County and Miles City, on the other hand, would have impact populations approximately one-third the size anticipated under the proposed rail line if it terminated in Colstrip rather than in Miles City.

Demand for Services

Facility expansion requirements for the Colstrip Alternative would be basically the same as those for the proposed rail line. The major facility needs in Rosebud County would not vary by alternative. Only those facilities estimated strictly as a function of the impact population size (e.g., equipment and vehicles) would differ; additional facilities needs for Rosebud County under the Colstrip Alternative would be approximately 25 percent higher than under the proposed rail line.

Custer County and Miles City are estimated to experience significantly lower facility requirements under the Colstrip alternative than under the proposed rail line because of the decrease in estimated impact population. The impact population is estimated to be small enough to eliminate the requirement for additional police or fire vehicles. Other facilities needs are approximately two-thirds below the levels associated with the proposed rail line's impact population. Table A2-46 presents the facilities requirements by jurisdiction for the Colstrip Alternative.

Fiscal Impacts

If the Colstrip alternative were implemented, both the residential location of the impact population and the incidence of tax revenues would vary from those projections presented for the proposed rail line. Under the Colstrip Alternative, the railroad would not be located in Custer County, and no taxing jurisdictions in that county would receive railroad property tax revenues. The impact population located in Custer County would be approximately one-third of that projected for the Proposed Action.

Table A2-47 presents the projected revenues for all jurisdictions under the Colstrip Alternative, medium production scenario, for the entire analysis period. As can be seen from this table, jurisdictions in Powder River County would receive the same revenues as projected for the Proposed Action. Revenues in Custer County would decrease significantly from those projected for the Proposed Action. The Rosebud County jurisdictions, with the exception of Birney, would receive slightly higher revenues as a result of the Colstrip Alternative. Birney would not change. Revenues of the State of Montana also would be consistent with those projected for the Proposed Action.

Tables A2-48, A-49, and A2-50 present the net fiscal balance for jurisdictions in Custer County, Rosebud County, and Powder River County, respectively, by reporting year and for the entire analysis period. Both Miles City and Custer County would receive revenues about equal to costs cumulatively over the period. Both jurisdictions would experience cashflow problems. Project-related costs would

TABLE A2-46

FACILITIES NEEDS[a]
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO, 1984-2010

JURISDICTION	1984-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2010	TOTAL
ROSEBUD COUNTY							
Schools							
Elementary District #4			3,510 sq. ft.				3,510 sq. ft.
Elementary District #19							
High School District #4							
High School District #19							
County services							
Police vehicles--purchase	1 vehicle		1 vehicle	1 vehicle			3 vehicles
replacement		1 vehicle	1 vehicle	2 vehicles	3 vehicles	3 vehicles	10 vehicles
Police facilities	240 sq. ft.		610 sq. ft.				850 sq. ft.
Office/library space	2,000 sq. ft.		4,900 sq. ft.				6,900 sq. ft.
Ambulances--purchase				1 vehicle			1 vehicle
replacement						1 vehicle	1 vehicle
County shop	810 sq. ft.		1,990 sq. ft.				2,800 sq. ft.
Parks & recreation land	11.5 acres		29 acres				40.5 acres
-recreation area	1 rec. area		1 rec. area	1 rec. area	1 rec. area		4 rec. areas
-tennis court			1 tennis court		1 tennis court		2 tennis courts
-softball field				1 softball field			1 softball field
Forsyth							
Water treatment							
Sewage treatment							
Fire vehicles				1 vehicle			1 vehicle
Fire station				210 sq. ft.			210 sq. ft.
Colstrip							
Water treatment							
Sewage treatment							
Solid waste							
Fire vehicles--purchase			1 vehicle				1 vehicle
Fire station			370 sq. ft.				370 sq. ft.
CUSTER COUNTY							
Schools							
Elementary District #1							
Custer County High School							
County services							
Police vehicles							
Police facilities							
Ambulances							
Office/library space	400 sq. ft.			250 sq. ft.			650 sq. ft.
County shop	170 sq. ft.			100 sq. ft.			270 sq. ft.
Parks & recreation	2.4 acres			1.4 acres			3.8 acres
Miles City							
Water treatment							
Sewage treatment							
Solid waste	.017 acre						.017 acre
Fire vehicles							
Fire station							

[a] Computed only for jurisdictions where population differs between the Proposed Action and the Colstrip Alternative

TABLE A2-47

PROJECTED TAX REVENUE RECEIPTS, BY JURISDICTION
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000s)

TAX REVENUE RECEIPTS BY YEARS

JURISDICTION	1985	1986	1987	1988	1989	1990	1991	1996	2001	2006	2010	CUMULATIVE TOTAL
State	242	2,873	5,395	9,672	14,247	14,534	14,620	36,272	60,252	75,684	91,665	1,256,055
Counties:												
Custer	--	38	27	41	22	7	10	29	51	64	52	1,028
Powder River	--	6	49	54	26	30	104	1,017	3,573	7,570	9,344	42,859
Rosebud	519	1,399	1,433	1,656	1,822	2,218	2,609	4,221	4,176	5,305	3,365	85,698
Cities:												
Broadus	--	2	19	23	13	15	17	44	79	114	111	1,512
Forsyth	--	4	15	9	22	22	27	50	81	129	146	1,906
Miles City	--	22	18	28	9	4	6	16	32	39	33	655
Elementary School Districts:												
Miles City #1	--	37	30	48	22	8	10	27	56	67	57	1,124
Birney #3	90	201	190	188	190	189	189	250	1,754	1,178	210	21,709
Forsyth #4	--	5	20	13	31	30	37	69	114	182	194	2,618
Other S.D.	--	2	2	--	--	1	1	3	5	5	5	114
Colstrip #19	98	224	227	230	216	218	220	251	311	843	1,177	11,363
Ashland #32J	233	632	770	968	1,153	1,907	2,017	3,412	2,612	5,309	1,115	79,654
Broadus #79J	--	2	39	28	15	16	20	51	91	130	127	1,867
Other S.D.	3	11	7	1	2	2	2	4	6	9	11	161
High School Districts:												
Custer	--	18	12	17	9	5	4	12	22	27	23	439
Powder River	--	1	9	10	5	6	17	39	470	1,020	1,426	11,128
Forsyth #4	--	2	7	4	11	10	13	24	39	63	67	905
Other H.S.	--	1	1	--	--	--	--	1	2	2	2	34
Colstrip	80	202	224	260	291	357	422	685	683	870	550	13,895
TOTAL	1,265	5,682	8,494	13,250	18,106	19,579	20,345	46,477	74,409	98,610	109,680	1,534,724

TABLE A2-48

PROJECTED NET FISCAL BALANCE, BY JURISDICTION, IN CUSTER COUNTY[a]
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000)

YEAR	COUNTY	MILES CITY	GOVERNMENT SUBTOTAL	CUSTER CO. HIGH SCHOOL	ELEM. $1	SCHOOLS SUBTOTAL	TOTAL
1984	$ -0-	$ -0-	$ -0-	$ -0-	$ -0-	$ -0-	$ -0-
1985	(41)	(17)	(58)	(13)	(66)	(79)	(137)
1986	(15)	(4)	(19)	(9)	(92)	(101)	(120)
1987	12	5	17	1	(104)	(103)	(86)
1988	36	24	60	14	(18)	(4)	56
1989	15	3	18	4	(51)	(47)	(29)
1990	-0-	(2)	(2)	(3)	(65)	(68)	(70)
1991	1	(1)	-0-	(1)	(63)	(64)	(64)
1996	(17)	-0-	(17)	(7)	(34)	(41)	(58)
2001	19	4	23	(10)	(71)	(81)	(58)
2006	24	3	27	(24)	(93)	(117)	(90)
2010	18	3	22	(28)	(63)	(91)	(69)
CUMULATIVE[b] TOTAL	$244	$ 38	$282	$(392)	$(1,757)	$(2,149)	$(1,867)

[a] Excludes "Other School Districts" [b] Includes entire analysis period

exceed revenues in many of the years prior to 1996, although the net fiscal deficit per capita would be less than one dollar.

Because of the additional portion of the rail alignment in Rosebud County, income to Rosebud County and to the Colstrip school districts would increase substantially. Revenues paid by the railroad would result in a net fiscal surplus for the Colstrip Elementary School District, as opposed to the deficit it would experience under the proposed rail line. Forsyth and its school districts, however, would not share in rail revenues, yet would experience more impact population. As a result, the negative fiscal impact projected for Forsyth and the Forsyth school districts would be larger under the Colstrip alternative than under the proposed rail line by 50 to 60 percent. The fiscal balance of the other jurisdictions in the project area would be unaffected by the Colstrip Alternative--the fiscal balance projected under the Proposed Action would prevail.

Table A2-51 presents the projected net fiscal balance for the State of Montana under the Colstrip Alternative. These projections are identical to those presented for the proposed rail line. Table A2-52 presents the costs, revenues, and net fiscal balance for all jurisdictions, by reporting year, for the Colstrip Alternative.

TABLE A2-49

PROJECTED NET FISCAL BALANCE, BY JURISDICTION, IN ROSEBUD COUNTY[a]
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000s)

YEAR	COUNTY	FORSYTH	GOVERNMENT SUBTOTAL	HS #4	HS #19	ELEM #3	ELEM #4	ELEM #19	ELEM #32J	SCHOOLS SUBTOTAL	TOTAL
1984	$ (120)	$ --	$ (120)	$ --	$ --	$ --	$ --	$ --	$ (13)	$ (13)	$ (133)
1985	120	(17)	103	(31)	(74)	73	(62)	(167)	(150)	(411)	(308)
1986	949	(3)	946	(15)	7	129	(29)	(118)	61	35	981
1987	1,227	(1)	1,226	(24)	120	155	(56)	26	561	782	2,008
1988	1,477	(5)	1,472	(27)	142	179	(49)	15	742	1,002	2,474
1989	1,621	4	1,625	(34)	169	180	(47)	(5)	908	1,171	2,796
1990	2,001	2	2,003	(41)	221	168	(52)	(9)	1,643	1,930	3,933
1991	2,373	6	2,379	(32)	273	190	(41)	(7)	1,665	2,048	4,427
1996	2,546	(3)	2,543	(90)	300	211	(208)	(235)	2,573	2,551	5,094
2001	3,328	(25)	3,303	(130)	110	1,684	(189)	(409)	1,813	2,879	6,182
2006	4,346	24	4,370	(155)	240	1,108	(127)	91	4,633	5,790	10,160
2010	2,408	36	2,444	(159)	(75)	154	(113)	493	6,546	6,846	9,290
CUMULATIVE[b] TOTAL	$67,078	$100	$67,178	$(2,587)	$2,171	$20,540	$(3,220)	$2,984	$64,231	$84,119	$151,3297

[a] Excludes "Other School Districts," elementary and high school
[b] Includes entire analysis period

TABLE A2-50

PROJECTED NET FISCAL BALANCE, BY JURISDICTION, IN POWDER RIVER COUNTY
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000)

YEAR	COUNTY	BROADUS	GOVERNMENT SUBTOTAL	POWDER RIVER HIGH SCHOOL	ELEM. #79J	SCHOOLS SUBTOTAL	TOTAL
1984	$ (66)	$ (2)	$ (68)	$ (9)	$ (8)	$ (17)	$ (85)
1985	(364)	(21)	(385)	(89)	(95)	(184)	(569)
1986	(509)	(25)	(534)	(135)	(149)	(284)	(818)
1987	(122)	4	(118)	(57)	(39)	(96)	(214)
1988	(142)	6	(136)	(65)	(61)	(126)	(262)
1989	(205)	(7)	(212)	(84)	(90)	(174)	(386)
1990	(230)	(7)	(237)	(97)	(106)	(203)	(440)
1991	(197)	(8)	(205)	(105)	(115)	(220)	(425)
1996	206	(23)	183	(257)	(252)	(509)	(326)
2001	2,267	(40)	2,227	(47)	(432)	(479)	1,748
2006	6,050	(13)	6,037	353	(464)	(111)	5,926
2010	7,762	(21)	7,741	707	(441)	266	8,007
CUMULATIVE[a] TOTAL	$16,290	$(633)	$15,657	$ 844	$(7,855)	$(7,011)	$8,664

[a] Includes entire analysis period

TABLE A2-51

PROJECTED STATE NET FISCAL BALANCE
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000s)

YEAR	REVENUES[a]	COSTS	NET FISCAL BALANCE
1984-1985	$ 242	$ 180	$ 62
1986	2,873	3,219	(346)
1991	14,620	1,896	12,724
1996	36,272	4,774	31,498
2001	60,252	9,648	50,604
2006	75,684	10,775	64,909
2010	91,655	11,399	80,256
CUMULATIVE[b] TOTAL	$1,256,055	$178,007	$1,078,048

[a] Excludes railroad income tax payments, because they could not be determined
[b] Includes entire analysis period

TABLE A2-52

PROJECTED REVENUES AND COSTS, ALL JURISDICTIONS[a]
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO, 1984-2010
(1981 $000)

YEAR	REVENUES	COSTS	NET FISCAL BALANCE
1984	$ --	$ 238	$ (238)
1985	1,023	1,876	(853)
1986	2,806	2,606	200
1987	3,096	1,367	1,729
1988	3,578	1,314	2,264
1989	3,859	1,500	2,359
1990	5,044	1,688	3,356
1991	5,724	1,852	3,872
1996	7,201	4,354	2,847
2001	14,150	6,285	7,865
2006	22,919	7,032	15,887
2010	18,008	6,703	11,305
CUMULATIVE TOTAL[b]	$278,521	$134,445	$144,076

[a] Revenues and costs exclude State of Montana and "Other School Districts"

[b] Includes entire analysis period

Sociological Impacts

Sociological impacts discussed for the proposed rail line can be applied to the Colstrip alternative. Those potential impacts to the Northern Cheyenne Indian Tribe, discussed under the Proposed Action, are similarly applicable to the Colstrip alternative.

A2.5 FOOTNOTES

1. Person-year equivalents are: total person-days of labor divided by working days per full time employee per year.

2. Mountain West Research Inc., "Assumptions Used in Modeling Economic and Demographic Change for the TRRC Impact Analysis," prepared for Ernst and Whinney, Billings, Montana, June 29, 1981 (Hereafter referred to as Mountain West Research, Inc., "Assumptions Used in Modeling Economic and Demographic Change").

3. Mountain West Research Inc., Pipeline Construction Worker and Community Impact Survey Final Report, prepared for Environmental Research and Technology, Inc., on behalf of the Northern Tier Pipeline Company, Billings, Montana, January, 1979.

4. Ernst and Whinney, Washington, D.C., June 18, 1981; and Mountain West Research Inc., "TRRC Proposed Action Impact--Total Population and Employment," prepared for Ernst and Whinney, Billings, MT, September 12, 1981.

5. Rice, Eldon, Rosebud County Planner, Forsyth, MT, Personal Communication, September 4, 1981.

6. Revenues that might accrue to state government and expenditures that might be required of state government were examined but in less detail. The lesser detail is due to the expectation that state revenues would far exceed expenditure requirements in the short term. Long term expenditure requirements are difficult to predict for the state.

7. The magnitude of inflation that may be experienced in the project area as a result of the proposed rail line and related actions is not clear. Studies of energy "boomtowns" state that rapid growth results in inflation rates that exceed state and national rates, but none of the studies document the inflation rates. A comparison of price indices for Wyoming towns and cities (1978-1980), which Ernst and Whinney made for this report, reveals that rapid growth areas experience consistently higher costs than other areas. However, the differences between the rapid growth and other areas is small (6 percent). Because the inflation rates that may be experienced in the project area are uncertain, it was not incorporated into the estimated public sector costs.

8. Mountain West Research Inc., "Assumptions Used in Modeling Economic and Demographic Change."

9. The sociological problems associated with towns experiencing rapid growth due to energy problems are discussed in sources such as the following:

(1) U.S. Department of Health, Education, and Welfare, Public Health Service, Drug and Alcohol Abuse in Booming and Depressed Communities (Washington, DC: Alcohol, Drug Abuse, and Mental Health Administration, 1980)

(2) Alma Lantz, Karen Sacket and Joseph Halpern, "Alcohol-related Problems in Rapidly Growing Communities," in The Boomtown: Problems and Promises in the Energy Vortex (Laramie: University of Wyoming, 1980) (Hereafter referred to as The Boomtown)

(3) Michael B. Enzi, "The Politics of Human Resources," in Boomtowns and Human Services (Laramie: University of Wyoming, 1979) (Hereafter referred to as Boomtowns and Human Services)

(4) Earle Warner, "Grassroots Organizing in Boom Towns," in Boomtowns and Human Services

(5) Robert Weisz, "Stress and Mental Health in a Boomtown," in Boomtowns and Human Services

(6) Donna C. Davidson, "An Overview of the Boomtown Phenomenon and Its Effect on Women and Minorities," in Energy Resource Development

(7) Judith A. Davenport and Joseph Davenport III, "The Wyoming Human Services Project," in Energy Resources Development

(8) Charles F. Contese and Bernie Jones, "The Sociological Analysis of Boom Towns," in Boomtowns and Human Services

(9) Joseph Davenport III and Judith A. Davenport, "Grits and Other Preventive Measures for Boom Town Bifurcation," in The Boomtown

(10) Raymond L. Gold et al., A Comparative Case Study of the Impact of Coal Development on the Way of Life of People in the Coal Areas of Eastern Montana and Northeastern Wyoming (Discussion Draft) (Missoula: Institute for Social Service Research, University of Montana, 1974)

10. Forty-four percent of households in Birney shop for groceries in Lame Deer, and 59 percent shop for major items in Billings. Sixty percent of the people surveyed in the Ashland district do their shopping in Ashland, and 52 percent shop for major items in Billings. It would be inconvenient for workers living off the reservation, with the exception of those in Birney, to shop in Lame Deer. See Northern Cheyenne Planning Committee, "Report to Montana Department of State Lands", submitted by Northern Cheyenne Planning Office, August 28, 1981, pp. 111 and 114.

11. Based on the types of personnel required in the first 2 years of operation, many positions could be filled by former Milwaukee Railroad employees who still reside in the Miles City area. A reduction of 70 to 80 Milwaukee employees has occurred since 1980 and most of the former employees have remained in Miles City. Chicago, Milwaukee, St. Paul, and Pacific Railroad, Miles City, Montana, June 1981.

12. Interviews with Sarpy Creek, Gillette/Orin and other ranchers on whose property is located a transportation right-of-way.

13. The model was developed by Mountain West Research, Inc., for the United States Department of the Interior and has been refined through numerous applications. BREAM can be categorized as an economic/demographic simulation model which analyzes the effects of various assumptions and scenarios on the population, employment, and income of a region. The model consists of three basic submodels, as follows:

(1) A demographic submodel accounts for population characteristics, such as births and deaths and age/sex composition. The supply of labor for a region is determined from labor force participation rates and the "survived" populations.
(2) An economic submodel determines labor demand using an economic base approach to estimate total employment from basic employment and income.
(3) A labor market submodel reconciles estimates of labor supply and labor demand. Labor market imbalances trigger either inmigration or outmigration resulting in consistent levels of population, employment, and income for the region.

BREAM contains two additional components used in this analysis. The community allocation submodel produces community specific population projections and impacts. A project information system organizes project-related information and other user-supplied inputs that form the alternative scenarios to be evaluated. See Mountain West Research, Inc. Bureau of Reclamation Economic Assessment Model (BREAM): Technical Description and User's Guide, Prepared for Water and Power Resources Service, U.S. Department of the Interior, Tempe, Arizona, August, 1980; and Mountain West Research, Inc., The Mountain West Research Inc., Economic/Demographic Model (BREAM), Billings, Montana, May, 1981.

14. Data assumptions are specified in the following:

(1) Mountain West Research, Inc., Bureau of Reclamation Economic Assessment Model (BREAM): Technical Description and Users Guide, Prepared for Water and Power Resources Service, U.S. Department of the Interior, Tempe, Arizona, August, 1980.
(2) Mountain West Research, Inc., The Mountain West Research, Inc., Economic/Demographic Model (BREAM), Billings, Montana, May, 1981.
(3) Mountain West Research, Inc., "Assumptions Used in Modeling Economic and Demographic Changes for the TRRC Impact Analysis," prepared for Ernst and Whinney, Billings, Montana, June 29, 1981.

15. IntraSearch, "Low, Medium, and High Scenarios," Billings, MT, May 20, 1981; and Montco, Inc., "Operational Payroll for Use in the EIS," Billings, Montana, February 2, 1981.

16. "Periodic Update Report of Housing Requirements for Colstrip Townsite Expansion Units 3 and 4," Billings, Montana, April, 1981. The construction requirements of the Montco Mine were derived from the

skill distribution of the New Rochelle Mine and the Montco labor forecasts.

17. Mountain West Research, Inc., "Assumptions Used in Modeling Economic and Demographic Changes", Section 5.1.2.

18. The estimate of the number of Indians who may be employed by Montco and the other mining companies was based on a survey of the Northern Cheyenne residents of the reservation and on current Indian employment at Colstrip. The survey, completed in July 1981, was funded by the Montana Department of State Lands and conducted by the Northern Cheyenne Tribe. Indian employment within Montana Power Company's work force at Colstrip was obtained by Montana Power Company (Colstrip, Montana, June 1981) and by Gunnar Fridriksson, former Director of Planning, Northern Cheyenne Planning Office (Lame Deer, Montana, June 1981). Montco has suggested that it may seek to employ a labor force comprised of 20 percent Indians but does not believe the goal to be realistic. (Montco, Billings, Montana, May 1981.) Hence, the 15 percent figure was established. This figure also was accepted by the Montana Department of State Lands for the impact analysis associated with the Montco mining permit application. A sensitivity analysis of the percentage of Indian employees resulted in the finding that the projected impact populations using a 10-percent Indian work force was little different from the impact population associated with a 15-percent assumption.

The remaining components of the mines' work force were calculated as follows:

(1) "Own construction" labor represents workers who will be involved in construction of the mine and subsequently would be employed in operating the mine. Wyoming Department of Labor and Statistics, Wyoming Coal Strip Mining: A Wage and Employment Survey (Cheyenne, WY, 1979); GeoWest, Inc., Billings, MT, January 18, 1981. The "Montco" component of "Montco and Own Construction" involves the allocation of workers laid off by Montco, as production is reduced, to the other mines.

(2) "Other Local" labor represents residents of the area not currently employed in construction Colstrip Units 3 and 4 (Mountain West Research, Inc., Billings, MT, June 1980).

(3) "Nonlocal" represents nonresidents not employed to construct Units 3 and 4, or migrants to the area. Fifteen percent of mine construction and employment must be highly skilled or have managerial experience. Thus, it was decided that a minimum of 15 percent of the mines' work force would be nonlocal. Otherwise, nonlocal labor is calculated by the model as a residual.

19. Mountain West Research, Inc., "Construction Worker Profile," report prepared for the Old West Regional Commission, Billings, Montana, December, 1975.

20. Individuals with whom the allocation of nonlocal employers was reviewed include Lonnie Beach, Powder River County Clerk; Ron Bidwell, Powder River Bank; Butch Griffin, Realtor, Miles City; Barbara Kennedy, Custer County Planning Director; Warren Knoll, Powder River Bank; Mac MacRae, Rosebud County Commissioner; Pat Reardon, Sunlight Development Corporation; Mark Stevens, President, Western Cheyenne Bank; Eldon Rice, Rosebud County Planner.

21. Through extensive personal and telephone interviews, each of the 11 industry sectors included in BREAM were divided into basic and nonbasic categories. Projections of future basic employment were then prepared, based on project specific and employer specific data as well as on historical trends. Growth trends were provided primarily by the employers and represent their best estimates with respect to the future of their businesses. Projections for the mining and construction sectors were based on an analysis of specific projects-i.e., those underway or permitted, such as the construction and operation of Montana Power Company's Units 3 and 4 at Colstrip, the expansion of the Big Sky Mine, the Rosebud Mine, and other smaller mines, and the continued development of the Colstrip community--as well as predictions of employers. Projections for the Transportation and Public Utility (TPCU) sector also were treated somewhat differently. In addition to employer-specific projections, independent estimates of future railroad employment were made based on the projections of traffic on the Burlington Northern mainline (Burlington Northern, Inc., Forsyth, Montana, January 27, 1981). Using existing rates of employees per daily train for Colstrip, Forsyth, and Miles City, projections of BN basic employment were derived.

22. "Boomtown" connotes growth so rapid that it is intractable and disruptive. "Boomtown" growth is often defined in terms of an annual rate of population growth. One research group which has studied "boomtown" phenomena concluded that a small town could accommodate a 5 percent (annual) increase in growth. It was further concluded that "an annual growth rate of 10 percent strains local service capabilities, above 15 percent seems to cause breakdowns in local and regional institutions" (Judith Davenport and Joseph Davenport, "The Wyoming Human Services Project," in Energy Resources Development). The State of Montana has established a population growth rate of 10 percent annually for any 3 years since 1972 as the eligibility criterion for coal severance impact assistance.

23. The first step in determining the potential residential location of railroad and mining employees was to define residential areas within the three project area counties. The boundaries were determined considering the following factors:

(1) Area (enumeration districts) used to report 1980 censes data
(2) Existing community boundaries
(3) The objective of defining primary impact areas in more detail than the secondary impact areas

(4) A 15-community or -area limitation in the model for allocation of direct employment

Based on these impact areas, separate residential distributions were determined for railroad and for mining employees by work force component. For railroad construction and operation, the residential distribution of nonlocal employees is based on the railroad's construction and operations plans. All railroad-operating personnel were assumed to locate in Miles City. The residential location of local railroad construction workers was based on current population distribution among areas with the probable railroad market area, given the assumed composition of the construction work force. For mining employees, residential distributions were determined for each of the following labor components: Indians, local Colstrip workers, other local workers, and nonlocal workers. Also, a distinction was made between Mine #4 and all other mines, because Mine #4 is located apart from the other mines and may draw from a different labor market area. See footnote 18 for a discussion of the composition of the mines' work force.

Indians employed by the mining companies were assumed to reside among three subareas of the Reservation: Lame Deer, St. Labre, and "other", according to existing population distributions among those areas. The residential distribution of local workers who would shift from employment at Colstrip Units 3 and 4 to the projected mines was based on a 1980 survey of the workers. Other local workers were allocated according to the current population distribution of areas within the mines' labor market areas. The distribution of nonlocal mine workers was determined after an extensive review of the capability of potential locations to absorb additional population, preferences of mine workers, and transportation system characteristics. (Mountain West Research, Inc., "Construction Worker Profile," prepared for Old West Regional Commission, Billings, MT, December 1975.)

24. GeoWest, Inc., Billings, MT, January 19, 1981, Bechtel Corporation.

25. Mountain West Research, Inc., "Assumptions Used in Modeling Economic and Demographic Changes," Section 5.3.3.

26. In allocating the employees among communities within each county, the following assumptions were used:

(1) In Custer County, all induced employment was allocated to the Miles City area.
(2) In Powder River County, all induced employment was allocated to Broadus.
(3) In Rosebud County:
    (a) Ashland was allocated a small percentage (about 10 percent). Its location vis-a-vis Broadus (MT), Colstrip (MT), and Sheridan (WY) would mitigate against significant commercial development.

(b) Historically, Forsyth has been the major recipient of induced employment in Rosebud County. Increased competition from Colstrip, however, will reduce the level of induced economic activity going to Forsyth. A 40-percent share to Forsyth was assumed.
(c) The maturity of Colstrip over time along with the Montana Power Company's apparent willingness to sell property in Colstrip for commercial development will make Colstrip an increasingly important trade center. About 30 percent of the induced employment was allocated to Colstrip.
(d) The remainder of the induced employment was distributed throughout the county.

27. Mountain West Research, Inc., Billings, MT, 1980. These estimates are comparable to those documented in several other references including <u>Rosebud County, 1981 Plan Update</u>; "Construction Worker Profile", prepared for the Old West Regional Commission, 1975; Colorado Department of Local Affairs, <u>1981 Annual Report to the State Legislature</u>; and <u>EPA Action Handbook</u>, 1978.

28. Housing density data were developed through reference to several sources:

(1) Montana Community Development Agency
(2) Land sale records for six recently developed subdivisions in Southeastern Montana.
(3) Current developments in Ashland and Colstrip
(4) Spring Creek Plans
(5) Rosebud County Planning Office data
(6) <u>Custer County 1980 Plan</u>
(7) <u>Powder River 1981 Plan Update</u>
(8) Colorado Department of Local Affairs
(9) <u>EPA Action Handbook</u>

29. The specific calculation, using single-family units as an example, is shown below:

100 population/2.82 persons per houshold = 35.5 units
55% of 35.5 units = 19.5 units

30. United States Department of Commerce, Bureau of Census, <u>1980 Census of Housing and Population--Montana</u>, Advance Reports, Washington, D.C., February, 1981.

31. Derivation of the factors was based on research of standards employed by government agencies and on studies of public service and facilities requirements. The primary sources of information include:

(1) Miles City/Custer County Planning Office
(2) Rosebud County Planning Office
(3) Powder River County Planning Office
(4) Eastern Montana Social and Community Service Task Force

(5) Montana Community Development Agency
(6) Montana State Board of Education
(7) Montana Department of State Lands
(8) Montana State Fire Marshall's Office
(9) Miles City, Montana, Fire Department
(10) Forsyth Public Schools Superintendent, Ryan Taylor
(11) U.S. Environmental Protection Agency
(12) U.S. Department of the Interior, Bureau of Land Management
(13) State of Colorado, Department of Community Affairs

32. The baseline population's demand for public services is incorporated into the analysis only insofar as it is required to estimate excess capacity of existing facilities. Present facility capacities were compared to total demand (demand by the baseline and impact populations) to determine whether the impact population would necessitate facility expansion. Expansion requirements which would not exist without the addition of the impact population were deemed to be an impact of the rail line and related actions. In cases where expansion would be required even without the impact population, attribution reflected the relative share of the baseline and impact populations' demands for the facility.

33. The lesser detail for state fiscal impact is due to the expectation that state revenues from energy development projects far exceed expenditure requirements.

34. The costs are expressed in constant (1981) dollars. See footnote 7.

35. Budget and expenditure data sources include:

(1) Budget for Custer County, Montana for years ending June 30, 1979; June 30, 1980; and June 30, 1981.
(2) Budget for Powder River County, Montana for years ending June 30, 1979; June 30, 1980; and June 30, 1981.
(3) Budget for Rosebud County, Montana for years ending June 30, 1980 and June 30, 1981.
(4) County Clerk's Annual Report to State Examiner, fiscal years ending June 30, 1979 and June 30, 1980, Custer County, Powder River County and Rosebud County.
(5) Budget Message, Town of Broadus, Powder River County, Montana, July 1, 1979 through June 30, 1980 and July 1, 1980 through June 30, 1981.
(6) Annual Report, Town of Broadus, Montana, 1978-1979, and 1979-1980.
(7) Budget Summary for the City of Forsyth Montana, for fiscal years ending June 30, 1979; June 30, 1980; and June 30, 1981.
(8) City of Miles City Operating Budget Documents--All Purpose Concept, for fiscal years ending June 30, 1979; June 30, 1980; and June 30, 1981.
(9) City Clerk's Annual Financial Report, Miles City, Montana, for fiscal years ending June 30, 1979 and June 30, 1980.

Persons contacted regarding city and county expenditures and budgets include Eldon Rice, Community Development Agent, Rosebud County; Barbara Kennedy, Custer County Planning Director (and formerly Powder River County Planning Director); Nolana Beach, Clerk and Treasurer, Broadus; Geraldine Nile, Clerk, Rosebud County; Karen Amende, Clerk, Powder River County; D.E. Woolhiser, Clerk, Custer County; Daniel Watson, Forsyth City Clerk's Office' Harvey Watts, Clerk, Miles City; Dan Dooley, Montana State Auditor for Counties and Municipalities.

36. The literature suggests that certain public services may vary disproportionatly with population change (i.e., less than or greater than the change). The data in this regard, however, are not conclusive.

37. To determine expenditures, the following criteria were used:

(1) If the expenditures show a definite historical trend (upward, downward, or stable), the most recent year's expenditure level (February 1980 inflated to 1981 dollars) was used.

(2) If the expenditures do not exhibit a definite trend, the annual average expenditure level was used. (All expenditures were expressed in 1981 dollars in calculating the average.)

38. Persons and agencies contacted with respect to current land prices include Glen Mader, Realtor, Broadus; W.A. Mitchell Agency, Miles City; Venable and Associates, Realtors, Miles City; John Howe, Real Estate Appraisers, Miles City; Powder River County Bank, Broadus; Cheyenne Western Bank, Ashland; Eldon Rice, Community Development Agent, Rosebud County; Barbara Kennedy, Custer County Planning Board.

39. Firms and individuals contacted with respect to construction and furnishings costs include Cumin and Associates, Billings; Cushing, Terrell, and Associates, Billings; Drake, Custason, and Associates, Billings; Morrison and Maierle, Billings; Sanderson, Stewart, and Gaston, Billings; Plains Engineering, Miles City.

40. Capital costs for water and sewer facilities are not included because these facilities are financed by user fees and therefore will not affect the net fiscal balance analysis.

41. All revenues are expressed in 1981 dollars. The property taxes to be paid by the TRRC were estimated based upon communications with representatives of the Montana Department of Revenue (Peat, Marwick, Mitchell, and Company, Washington, D.C., June 15, 1981). Property taxes levied against the mines will be a function of the taxable value of each mine in terms of four tax categories: gross proceeds, land and improvements, mining machinery, coal and ore haulers. (Layton S. Thompson, The Taxation and Revenue Systems of State and Local Government in Montana, Revised Edition, 1980. Montana Agricultural Experiment Station Bulletin 707, Montana State University, Bozeman, Montana, pp. 10-11; hereafter referred to as Layton S. Thompson, Taxation and Revenue Systems Bulletin 707). The property

tax liabilities for the latter three categories were calculated using Montco property values to represent property values for the other four mines as well. (Montco, "Estimated Value of Montco Mine By Tax Class," Billings, Montana, February 4, 1981.) Information pertaining to coal production was obtained by IntraSearch, Billings, MT, May 20, 1981, and the Montana Department of Revenue, Research and Information Branch, Montana Major Mine Production Figures, Fiscal Year 1981.

42. Corporate Property Tax: Montana Agricultural Experiment Station, Montana State University, The Taxation and Revenue System of State and Local Government in Montana, Revised Edition, 1980 Bulletin 723, Bozeman, Montana, August 1980, pp. 9-15. Coal Production-related taxes: Layton S. Thompson, Taxation and Revenue Systems Bulletin 707, p. 20. Corporate Income or License Tax: Peat, Marwick, Mitchell and Company, Washington, D.C., September 25, 1981; Montco, Billings, MT, February 4, 1981; Montana State Department of Revenue, Report of the State Department of Revenue, June 30, 1980, p. 119. Personal Income Tax: Peat, Marwick, Mitchell, and Company, May 26, 1981; Montana State Department of Revenue, Op. Cit., pp. 122-123, factored to 1981 dollars at 10 percent a year from 1979 to 1981.

43. Environmental impact statement scoping meeting held by the Interstate Commerce Commission, Miles City, Montana, August 8, 1980; workshop sponsored by the Miles City/Custer County Planning Board, Miles City, Montana, September 15, 1980.

44. Sources pertaining to "boomtowns" include the following:

(1) Charles F. Cortese and Bernie Jones, "The Sociological Analysis of Boom Towns," in Boomtowns and Human Services (Laramie: University of Wyoming, 1979) (Hereafter referred to as Boomtowns and Human Services)

(2) Joseph Davenport III and Judith A. Davenport, "Grits and Other Preventive Measures for Boomtown Bifurcation," in The Boomtown: Problems and Promises in the Energy Vortex (Laramie: University of Wyoming, 1980) (Hereafter referred to as The Boomtown)

(3) Judith Davenport and Joseph Davenport, "The Wyoming Human Services Project," in Energy Resources Development

(4) Donna C. Davidson, "An Overview of the Boomtown Phenomeon and Its Effect on Women and Minorities," in Energy Resources Development

(5) Raymond L. Gold, et al., A Comparative Case Study of the Impact of Coal Development on the Way of Life of People in the Coal Areas of Eastern Montana and Northeastern Wyoming, Discussion Draft (Missoula: Institute for Social Service Research, University of Montana, 1974)

(6) Alma Lantz, Karen Sackett, and Joseph Halpern, "Alcohol-related Problems in Rapidly Growing Communities," in The Boom Town

(7) Michael B. Enzi, "The Politics of Human Resources," in Boom Towns and Human Services

(8) U.S. Department of Health, Education, and Welfare, Public Health Service, Drug and Alcohol Abuse in Booming and Depressed Communities (Washington, DC: Alcohol, Drug Abuse, and Mental Health Administration, 1980)

(9) Earle Warner, "Grassroots Organizing in Boomtowns," in Boomtowns and Human Services

(10) Robert Weisz, "Stress and Mental Health in a Boomtown, in Boomtowns and Human Services

45. The State of Montana has established a population growth rate of 10 percent annually for 3 consecutive years as the eligibility criterion for coal severance impact assistance.

46. Montana Department of State Lands, Preliminary Draft Environmental Impact Statement, Montco Mine, Rosebud County, Montana, March 1982, pp. II-57, II-61 through II-63, II-67, III-57, III-59, III-60, III-63, III-65. (Hereafter referred to as Montana Department of State Lands, Preliminary DEIS, Montco Mine)

47. See the survey by DSL, Montana Department of State Lands, Preliminary DEIS, Montco Mine, pp. 11-62.

48. A household survey was undertaken by the Northern Cheyenne Tribe Planning Office to obtain baseline information about the social and economic life of families on the Northern Cheyenne Reservation and to obtain the attitudes of tribal members towards the impact of Montco and other coal mine development. The reports by the Planning Office to the Montana Department of State Lands in part rely on this survey. See Northern Cheyenne Planning Committee, "Report to the Montana Department of State Lands," Northern Cheyenne Planning Office, August 1981 and December 1981.

49. Montana Department of State Lands, Preliminary DEIS, Montco Mine, pp. II-62, III-55.

50. Ibid., pp. III-39 through III-44, III-62, III-63.

51. Ibid., pp. III-63; Northern Cheyenne Planning Committee, Memo regarding revisions of draft, Northern Cheyenne Planning Office, Lame Deer, Montana, December 17, 1981, p. 6 (Hereafter referred to as Northern Cheyenne Planning Committee, Memo additions, Dec. 17, 1981).

52. Montana Department of State Lands, Preliminary DEIS, Montco Mine, p. III-73.

53. Ibid., p. III-62; Northern Cheyenne Planning Committee, Memo additions, Dec. 17, 1981.

54. Montana Department of State Lands, Preliminary DEIS, Montco Mine, pp. III-62, III-63.

55. Ibid., p. III-63; Northern Cheyenne Planning Committee, "Report to the Montana Department of State Lands," Northern Cheyenne Planning Office, December, 1981, p. 2 (Hereafter referred to as Northern Cheyenne Planning Committee, "Report," Dec. 1981).

56. Montana Department of State Lands, <u>Preliminary DEIS</u>, <u>Montco Mine</u>, p. III-63; Northern Cheyenne Planning Committee, "Report," Aug. 1981, pp. 94, 107; Northern Cheyenne Planning Committee, "Report," Dec. 1981, p. 6.

57. Montana Department of State Lands, <u>Preliminary DEIS</u>, <u>Montco Mine</u>, p. III-79; Northern Cheyenne Planning Committee, "Report," Dec. 1981, p. 4.

A3.0 TRANSPORTATION

A3.1 PROPOSED ACTION

The following discussion presents those assumptions and methodologies used to assess the potential impact to transportation systems from the construction of the proposed railroad and alternative alignments. The principal topics of analysis include: (1) the disruption to highway traffic; (2) the degradation of existing transportation systems; (3) delays to vehicular traffic. Data is presented for construction, for operation and maintenance, for downline associations, and for related actions (e.g., the construction of five surface coal mines). The analysis particularly emphasizes the potential impacts to downline transportation systems. The railroad traffic projections in this analysis are derived from the low, medium, and high coal production estimates presented in Chapter 3.

A3.1.1 Construction

A service road would be established within the right-of-way of the proposed rail line prior to construction. Workers and materials would be transported to the construction site on this road. In addition, since the line would be constructed in segments, a work train would be used to carry ballast and track to the progressive construction sites as rail is laid on the trackbed. The Tongue River Railroad Company (TRRC) also plans to use existing state and county roads in the area to transport materials and further plans to negotiate access to the construction sites over private roads. Given this approach, the construction of new access roads outside of the right-of-way should be unnecessary.

A3.1.1.1 Disruption of Highway Traffic

The maximum use of the right-of-way's service road and track line to transport materials and labor would reduce the potential impact from the construction of the TRRC railroad. The potential increases in these traffic volumes also would be reduced because the construction work force and the construction activity would be dispersed along the right-of-way and because many workers would live in temporary camps along the right-of-way. Thus, the workers' need for travel to the construction site would be reduced, and the concentration of work areas within only a few road segments would be avoided.

During the construction period, highway system traffic volumes would increase primarily on the Tongue River Road and, to a lesser extent, on the road between Birney and Ashland (FAS 566). Insofar as the existing roads are used to transport materials to the construction sites by truck, traffic delays may be experienced. Yet, since most of the materials, particularly bulk materials, are expected to be moved by rail or by trucks within the right-of-way, the impacts on local traffic are likely to be small.

Temporary delays, at locations where the rail line would cross a public or private road, might occur with the construction of the rail line. Fourteen public road crossings, eight of which are grade separated, would occur with the railroad, using the Ashland SE Alignment. If the Ashland NW Alignment were selected, there would be two additional public road crossings. All but one of the crossings in the Ashland area for either the Ashland SE or Ashland NW Alignment would require the construction of grade-separated crossings. A provision that the TRRC maintain one open vehicular traffic lane at all times during construction would ensure only minimal delays at these crossings.

A3.1.1.2 <u>Degradation of the Road System</u>

Most of the construction workers and materials would be transported within the right-of-way, and the work force and the construction activities would be dispersed along the rail alignment. Therefore, impacts to existing roads within the project area are likely to be minor. Insofar as these roads are used to transport materials to the construction site by truck, the maintenance requirements of the roads may increase. Maintenance requirements that might result from this situation would depend upon the current road conditions and upon the increases in traffic.

A3.1.2 <u>Operation and Maintenance</u>

A direct effect of the operation of the TRRC railroad upon transportation in the project area is the delay of vehicles at rail/highway crossings. In turn, these vehicular delays may create repercussions on emergency service deliveries, on community development, and on travel patterns. Figure A3-1 shows the rail line segments for the proposed and alternative alignments that are addressed in this section. These segments include portions of the Burlington Northern (BN) and abandoned Milwaukee Road rail lines in the three-county project area.

A3.1.2.1 <u>Delay of Highway Traffic at Grade Crossings</u>

The procedure used to calculate the number of vehicles delayed at rail/highway grade crossings involves the following equation:

$$\text{Expected Delays} = (P) \times (\text{ADHT})$$

In the equation, <u>P</u> represents the probability of delay and <u>ADHT</u> represents the average daily highway traffic. In addition to calculating the number of vehicles delayed, the percentage of trips delayed and the average duration per delay were estimated. In rural areas, the percentage of trips delayed equals the estimated number of vehicles delayed, divided by the <u>ADHT</u>, at each crossing. Within communities, the percentage of trips delayed equals the total vehicles delayed at all crossings, divided by an estimate of the total trips made within

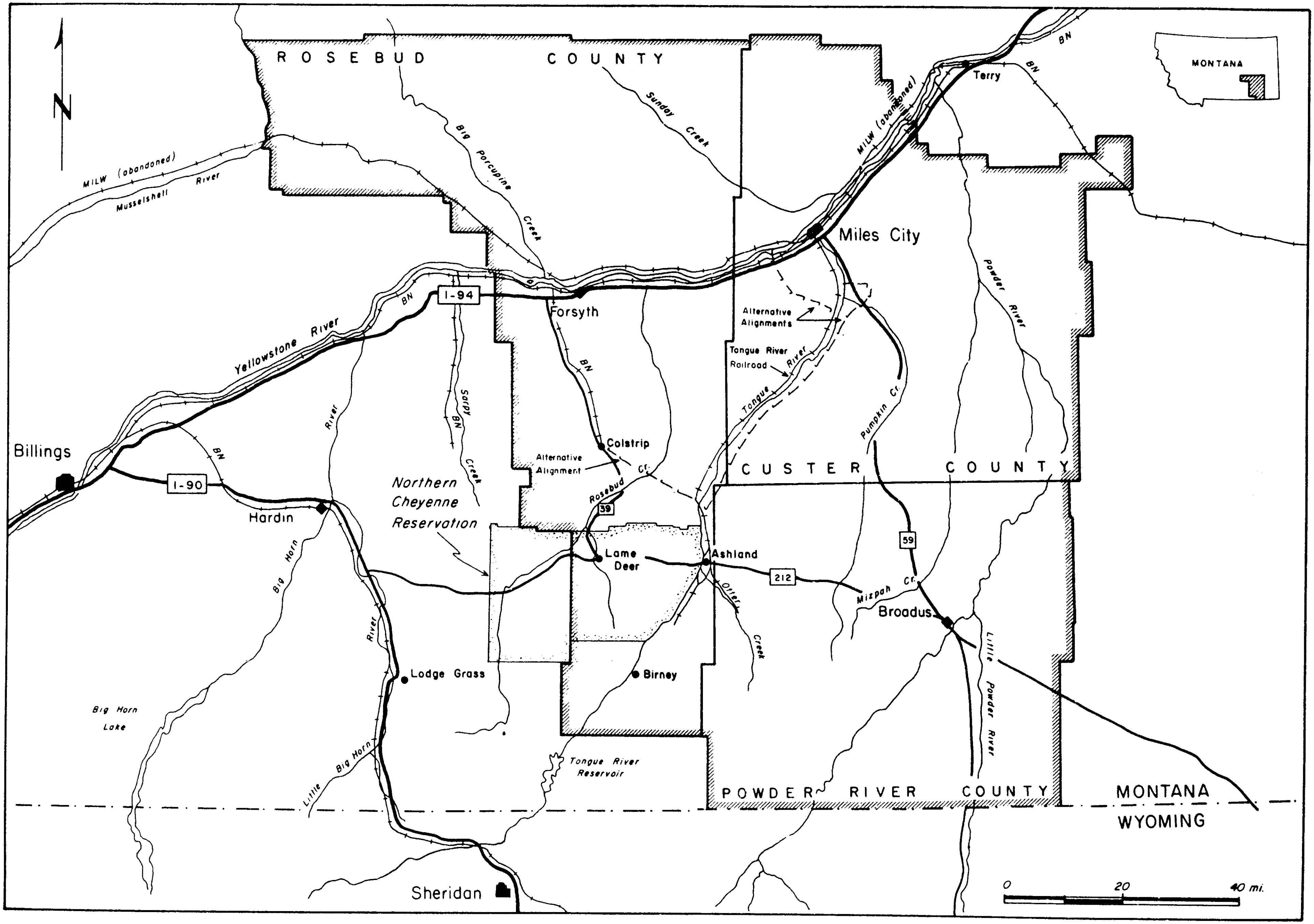


Figure A3-1. TRRC Project Area.

the community for identical time periods.[1] The average duration per delay equals one-half of the expected blocked-crossing time per train.

In applying these calculation procedures, rail/highway crossings were divided into five separate groups, as follows:

(1) Crossings on the Burlington Northern (BN) mainline east of Miles City
(2) Crossings on the Burlington Northern mainline west of Miles City
(3) Crossings on the Milwaukee Road (MR) mainline east of Miles City
(4) Crossings on each of the TRRC rail line alternatives
(5) Crossings within each affected community--Ashland, Forsyth, Miles City, and Colstrip.[2]

For each set of crossings, a data base was developed, consisting of train traffic, train speed, and automobile traffic.[3]

The projections for the daily crossing delays for the project area, assuming the operation of the proposed railroad under the medium coal production scenario, are presented in Table A3-1. The percentage of total trips delayed ranges from less than 0.3 percent in 1986/87 to 2 percent in 2011. The delays at some crossings, however, would be higher than these area-wide percentages.

Average train speeds would be slower in communities (15 mph) than in rural areas (35 mph), and communities would experience more delays than would rural areas. Forsyth and Miles City would experience the greatest number of delays and the highest percentage of delayed trips. Daily TRRC train movements within Miles City would be greater than the number of daily trains because all trains would enter the city on the abandoned Milwaukee Road line and then proceed to the new interchange yard, before proceeding east and west to their ultimate destinations. Thus, some trains would move through Miles City twice.

No significant difference in crossing delays is anticipated for the Ashland area with either the Ashland SE Alignment or the Ashland NW Alignment. All but one of the crossings along the Ashland NW Alignment would be grade separated. The access road to the Snodgrass Court includes the crossing that would not be grade separated, and crossing delays would be experienced. However, alternate access to the Snodgrass Court would, in part, mitigate potential problems.

The crossing delays would vary by coal production scenario. Under the high production scenario, the project area delays may be 15 percent higher than under the medium scenario by the year 2011. Under the low production scenario, the variation in delayed vehicles from the medium scenario is just the reverse of the high scenario. The expected duration per delay would not vary among the scenarios.

TABLE A3-1

DELAYS AT CROSSINGS--BASELINE CASE (NON-TRRC TRAINS) AND TRRC TRAINS[a]

AVERAGE DAILY VEHICULAR DELAY

LOCATION AND DELAY STATISTICS	1986-1987 NON-TRRC	1986-1987 TRRC	1991 NON-TRRC	1991 TRRC	1996 NON-TRRC	1996 TRRC	2001 NON-TRRC	2001 TRRC	2006 NON-TRRC	2006 TRRC	2011 NON-TRRC	2011 TRRC
Forsyth												
Delayed Vehicles	683	31	793	32	1,000	112	1,115	198	1,223	246	1,402	294
Average Delay/vehicle (min.)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
% of Trips Delayed[c]	6.1	0.3	7.1	0.3	8.4	0.9	8.7	1.5	9.3	1.9	10.3	2.2
Miles City												
Delayed Vehicles	1,085	139	1,250	287	1,467	755	1,484	1,292	1,589	1,605	1,805	2,018
Average Delay/vehicle	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
% of Trips Delayed	2.5	0.3	2.9	0.7	3.4	1.8	3.5	3.1	3.8	3.8	4.2	4.7
Rural-TR												
Delayed Vehicles		0		1		3		6		8		10
Average Delay/vehicle	n/a	1.4	n/a	1.4	n/a	1.4	n/a	1.4	n/a	1.4	n/a	1.4
% of Trips Delayed[d]		0.0		0.5		1.5		2.6		3.4		4.1
Rural-BN												
Delayed Vehicles	73	4	82	10	100	17	109	29	119	38	135	48
Average Delay/vehicle	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
% of Trips Delayed	3.1	0.2	3.5	0.4	4.1	0.7	4.3	1.1	4.6	1.4	5.0	1.7
Total												
Delayed Vehicles	1,841	174	2,125	330	2,567	887	2,708	1,525	2,931	1,897	3,342	2,370
Average Delay/vehicle	3.0	2.7	3.0	2.7	3.0	2.7	3.0	2.7	3.0	2.7	3.0	2.7
% of Trips Delayed[e]	1.9	0.2	2.2	0.3	2.8	0.8	2.8	1.4	3.0	1.6	3.4	2.0

a This table does not include delays for emergency and fire vehicles. These figures are presented in separate tables

b The average delay per vehicle is the weighted average for all delayed vehicles

c The percent of trips delayed in towns equals total delayed vehicles/(population ÷ 2.8 persons per household x 10 trips per household per day)

d The percent of trips delayed in rural areas equals delayed vehicles ÷ AADT at crossings, which also equals the probability of delay at crossings

e The percent of trips delayed for all areas is calculated as per footnote 1 in the text, using the regional population

The assessment of vehicular delays at rail/highway crossings should be considered in the context of the baseline case (i.e., those delays expected to occur without the construction of the TRRC rail line).[4] The projected vehicular delays associated with non-TRRC trains are presented in Table A3-1. These projections indicate that the addition of TRRC trains would increase the expected baseline delays, during the early years, by less than 10 percent area-wide. By 2011, delays including TRRC trains would be 70 percent higher than the baseline forecast. The combination of TRRC trains and other trains would result in delays to less than 3 percent of area-wide trips in 1991. By 2011, delayed area-wide trips would increase to 5.4 percent. The average delay per vehicle would not change appreciably through the period 1986/87-2011.

Cumulative delays for Miles City and Forsyth, under the high and low production scenarios, would vary from the medium scenario by approximately +/-25 percent, respectively.

A3.1.2.2 <u>Disruption in Community Services</u>

The presence of trains not only could inconvenience drivers of vehicles delayed at railroad/highway crossings, but also could disrupt a community's provision for emergency services. Emergency service delay estimates for fire emergencies and for medical emergencies were projected for each community that would be affected by TRRC trains operating along the proposed route--i.e., Ashland, Forsyth, and Miles City. The delays were estimated for every fifth year, beginning in 1986/87, and for each coal production scenario. The delays attributable to TRRC trains were distinguished from those delays attributable to other trains. The key parameters for estimating emergency service delays include: the number of emergency calls per year; the number of grade crossings traveled in responding to emergencies each year; the probability of delay at those crossings used in responding to emergencies.[5] The emergency service data were obtained from service providers in each community.[6]

Ashland's emergency services would not be affected significantly by TRRC trains. With the Ashland SE Alignment, two public crossings of the proposed rail line near Ashland would be overpasses. If the Ashland NW Alignment were used, one crossing would pose a problem for emergency services. Emergency vehicles would, in instances of blocked crossings, have to reach Snodgrass Court by an indirect route. The fire station would remain accessible to most parts of Ashland, although it would be separated from most of the community. A crossing of the St. Labre BIA Road on which the fire station is located would be grade separated.

In Forsyth, every emergency call requires at least one rail crossing for the ambulance service and fire service volunteers to travel to the stations. In addition, approximately one-third of the calls require a second rail crossing in traveling from the station to the site of the emergency.

In Miles City, rail crossings are required only when the emergency is located north of the abandoned Milwaukee Railroad line. Approximately 15 percent of the city's medical emergencies and 20 percent of its fire emergencies occur north of the rail line. Mitigating the potentially adverse consequences of delays to reaching emergencies north of the Milwaukee line is a fire department substation located in that area. This station can provide no delay, first response service to medical and fire emergencies.

Delays to emergency services attributable to TRRC trains are presented in Tables A3-2 and A3-3, which also show delays resulting from non-TRRC trains--the baseline case. These projections reveal that, with no TRRC trains operating, no emergency service delays would be experienced in Miles City. With the TRRC in operation, some emergency service delays could occur. Forsyth would experience the most significant case of emergency service delay, primarily due to slower train speeds through the city and due to the large number of crossings required to respond to medical emergencies.[7]

TABLE A3-2

PROJECTED ANNUAL MEDICAL EMERGENCY DELAYS
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO

		ESTIMATED NUMBER OF EMERGENCY CALLS DELAYED BY		PERCENTAGE OF EMERGENCY CALLS DELAYED BY		
LOCATION	YEAR	TRRC TRAINS	NON-TRRC TRAINS	TRRC TRAINS	NON-TRRC TRAINS	ESTIMATED DURATION OF DELAYS (minutes)
Miles City	1986/87	1	-0-	0.2%	-0-	4.0
	1991	3	-0-	0.5%	-0-	4.0
	1996	7	-0-	1.3%	-0-	4.0
	2001	13	-0-	2.4%	-0-	4.0
	2006	17	-0-	3.1%	-0-	4.0
	2011	21	-0-	3.8%	-0-	4.0
Forsyth	1986/87	2	35	1.1%	18.9%	4.0
	1991	3	41	1.7%	22.2%	4.0
	1996	6	52	3.0%	26.0%	4.0
	2001	10	56	4.8%	26.7%	4.0
	2006	13	63	5.9%	28.6%	4.0
	2011	15	71	6.7%	31.6%	4.0

Cumulative delays for Miles City and Forsyth under the high production or the low production scenarios would vary from the medium scenario by approximately ±25 percent, respectively.

TABLE A3-3

PROJECTED ANNUAL FIRE EMERGENCY DELAYS
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO

LOCATION	YEAR	ESTIMATED NUMBER OF EMERGENCY CALLS DELAYED BY TRRC TRAINS	ESTIMATED NUMBER OF EMERGENCY CALLS DELAYED BY NON-TRRC TRAINS	PERCENTAGE OF EMERGENCY CALLS DELAYED BY TRRC TRAINS	PERCENTAGE OF EMERGENCY CALLS DELAYED BY NON-TRRC TRAINS	ESTIMATED DURATION OF DELAYS (minutes)
Miles City	1986/87	0-1	-0-	0.1%	-0-	4.0
	1991	1	-0-	0.6%	-0-	4.0
	1996	2	-0-	0.9%	-0-	4.0
	2001	4	-0-	1.6%	-0-	4.0
	2006	5	-0-	2.1%	-0-	4.0
	2011	6	-0-	2.5%	-0-	4.0
Forsyth	1986/87	0-1	3	0.8%	16.7%	[illegible].0
	1991	0-1	3	1.5%	17.3%	4.0
	1996	0-1	4	2.3%	20.5%	4.0
	2001	1	4	3.7%	21.1%	4.0
	2006	1	5	4.6%	23.0%	4.0
	2011	1	6	5.3%	25.1%	4.0

The consequences of crossing delays for fire emergencies would mean that property losses may increase. In regard to medical emergencies, the percentage of cases in which a delay would be critical for the patient is small.

A3.1.2.3 Community Development Implications

Trains can disrupt the provision of emergency services and can reduce accessibility within a community. In the extreme case, a large volume of train traffic through a community could result in severing its community services, isolating some of its neighborhoods from the larger community, and creating less desirable development patterns--e.g., causing a decentralization of commercial activity.

Area-wide delay statistics indicate that overall travel in the project area would not be affected significantly by TRRC trains. However, in assessing impacts for the specific segments of a community, the probability of delay in specific locations and for specific trip purposes is important.

The probability of delay at Ashland's two private road crossings, one of which is located within the Tranel Subdivision, is projected to range from 1 percent in 1991 to 4 percent in 2011. This magnitude is neither sufficiently large to isolate neighborhoods from the larger community nor to disrupt existing development. The rail line may influence the location of new commercial and residential developments in and around Ashland, which are projected to result from the related coal mines.

The decreased access to the Snodgrass Court for the Ashland NW Alignment would cause delay problems primarily for the residents of that area of Ashland, and development problems for that particular area. Ashland as a whole would experience few community development impacts beyond an increase in the isolation of the Snodgrass Court from the larger community.

Both the abandoned Milwaukee Road line and the Burlington Northern mainline traverse Miles City. Currently an average of 16 trains per day pass through the city, 6 of which are coal trains and 10 of which are merchandise trains. These trains block crossings in Miles City for about 5.7 percent of the average day. The addition of TRRC trains would increase crossing delays within Miles City on the Burlington Northern line and on the Milwaukee Road line west of the railyard.

Delays on the Burlington Northern line in Miles City, attributable to TRRC trains, could increase the percentage of delayed trips by less than 1 percentage point in 1991 and 4.7 percentage points in 2011 (Table A3-1). This increase is unlikely to affect either travel behavior or development patterns. The percentage of delays for Miles City can be applied to those for Spotted Eagle Recreation Area. Access to the Branum Lake Fishing Access site would not be seriously affected by delays, since the area can be reached without crossing either the Burlington Northern or the TRRC lines.

Whereas TRRC trains would add insignificantly to delays experienced at Burlington Northern crossings, problems in Miles City could occur, given the projection of total, future train traffic. Non-TRRC and TRRC trains would block crossings on the Burlington Northern line for less than 9 percent of the average day in 1991, and for 14 percent in 2011. Particularly at the higher level of delay probability, consideration should be given to building another grade separation to avoid traffic disruption and its potention repercussions--e.g., its effect on commercial developments.

Forsyth is divided by the Burlington Northern mainline and serves as a crew change location. Currently 16 trains a day operate through Forsyth, including 10 coal trains and 6 merchandise trains (these trains are reflected in the Miles City/Terry segment for downline discussions). Excluding TRRC trains, the number of trains is projected to increase to 23 by 1991 and to 33 by 2011. As a result, the probability of delay at crossings in Forsyth would increase from approximately 9 percent currently to almost 19 percent by 2011. The average duration of delay would be 4 minutes. With the number of trains projected, Forsyth could experience serious traffic and service disruptions. The construction and operation of a TRRC rail line would add to the delay problems projected for Forsyth, but the relative contribution would be small. By 1991, TRRC trains would delay less than 1 percent of the vehicles crossing Burlington Northern lines. By 2011, the percentage of vehicles delayed by TRRC trains could increase to 2 percent (Table A3-1).

A3.1.2.4 Mitigative Measures

Low cost actions and their potential effectiveness in reducing rail and community conflicts are presented in Tables A3-4 and A3-5. These actions include the installation of crossing-warning devices. A more expensive improvement is the construction of grade-separated crossings.[8] An assessment of the type of crossing improvement required for each crossing was performed, using Montana Department of Highways criteria governing grade-crossing improvements.[9] Nearly 45 percent of the crossings affected by TRRC trains were determined to warrant possible upgrading if the proposed railroad were built. However, most of this upgrading would be minor. Table A3-6 presents an estimate of the grade-crossing improvements that might be required for the TRRC railroad.

TABLE A3-4

POTENTIAL LOW COST SOLUTIONS TO RAILROAD/COMMUNITY CONFLICTS

RAILROAD OPERATING PRACTICES

- Ensure standing trains and local switching trains do not activate warning services unnecessarily
- Ensure trains do not stand in crossings unless necessary
- Do not idle engines while trains are standing for long periods of time
- Control train speeds through communities
- Consolidate traffic on a single line
- Divert traffic to alternative routes
- Change switching-operations schedules
- Establish procedures to break trains in emergency situations

RAILROAD FACILITIES

- Change location of train verifiers
- Change location of crew change points
- Improve maintenance and appearance of track right-of-way
- Extend sidings; construct additional sidings
- Straighten track alignment
- Upgrade warning device activators
- Upgrade switches
- Change location of switching operations
- Decrease derailment possibilities
- Change train refueling location
- Change train maintenance location

TABLE A3-4. POTENTIAL LOW-COST SOLUTIONS (continued)

COMMUNITY TRANSPORTATION FACILITIES
- Widen street at grade crossing
- Locate additional warning devices farther from crossing
- Improve crossing maintenance
- Improve crossing and crossing approach maintenance in winter
- Improve or upgrade warning devices
- Divert traffic to alternative routes
- Designate emergency-vehicle-only routes
- Extend gate arms
- Modify approach gradients
- Synchronize warning signals and traffic lights
- Develop/improve pedestrian crossings
- Construct new at-grade crossings
- Close at-grade crossings

RAILROAD/COMMUNITY COMMUNICATION
- Establish communications between emergency service providers and the local train controller
- Establish communication channels between railroad and community officials

COMMUNITY DEVELOPMENT PATTERNS
- Remove visual obstructions adjacent to the mainline
- Conduct preventive planning and related actions, such as zoning and intrastructure development
- Relocate storage facilities containing combustible products off the mainline

COMMUNITY SERVICES
- Outfit firefighters with personal emergency equipment
- Acquire new fire equipment and construct new fire sheds
- Reroute school buses
- Reroute transit vehicles
- Establish special emergency vehicle routes
- Establish alternative emergency medical procedures
- Establish coordination between jurisdictional fire services

BEHAVIOR MODIFICATION
- Campaign to change people's perceptions of problems
- Conduct safety education programs
- Enforce laws against violating warning signals

TABLE A3-5

ESTIMATED EFFECTIVENESS OF LOW COST ACTIONS IN REDUCING CROSSING PROBLEMS IN SELECTED CITIES AND TOWNS[a]

COMMUNITY	ACTION	POTENTIAL REDUCTION IN PRIORITY PROBLEM MAGNITUDES			ESTIMATED COST	
		EMERGENCY VEHICLE DELAYS	VEHICLE DELAYS[b]	ACCIDENTS	CAPITAL	O&M[c] (ANNUAL)
Beach, ND	Install GCPs (Grade Crossing Predictor) at the 2nd Ave. and Central Ave. crossings.	-20%	-20%	-35% (Vehicle accidents)	$140,000	$ 1,500
	Shorten the existing rail siding, rearrange trackage and install power switches. Generally restrict siding use to one train at a time.	-10% to -40%	-10% to -40%	Uncertain improvement in vehicle and pedestrian safety.	Over $200,000	--
Casselton, ND	Install gates at 3rd and 6th Ave. crossings. Install GCPs to activate warning signals at all crossings. Close the 8th Ave. crossing. Construct a pedestrian grade-crossing at 9th Avenue.[d]	-15%	-15%	-70% (Vehicle accidents)	$260,000	Savings of $ 1,000
	Institute safety education program in the schools.	--	--	Uncertain improvement particularly in pedestrian safety.	$500	$500
Elk River, MN	Implement Jackson St./IH-10 intersection improvements.	--	-15% to -40%	Uncertain vehicle safety improvements	$ 25,000	$ 1,000
	Establish a fire service/railroad emergency communication system.	-30% (fire service delays)	--	--	$ 1,000	--
	Install GCPs to activate the gates at all crossings (i.e., Proctor, Jackson, and Main).	-20%	-20%	-35% (Vehicle accidents)	$195,000	$ 1,000
Kelron, ND	Extend the existing siding 1800' to the west; flatten track curvature; and replace the manual switch with a power switch at each end at the siding.	-25%	-25%	--	$360,000	--
	Installation of fencing on the north side of the mainline between Elk and Elm Sts. Establish school safety patrols.	--	--	Uncertain pedestrian safety improvement.	$ 10,000	--
	Installation of GCPs and gates at the Elk, Elm, and West St. crossings.	-15%	-15%	-50% (Vehicle accidents)	$260,000	$ 2,500
Moorhead, MN	Install a power switch to replace the manual switch at the Dilworth yard lead.				$ 59,000	Railroad operating savings up to $9,500.
	Install GCPs to activate all crossing signals on the old MP line.	-35%	-40%	-35% (Vehicle accidents)	$435,000	$ 3,000
	Increase allowable train speed from 25 mph to 35 mph on the old MP line.				$ 40,000	Potential RR savings.
	Establish a rescue squad operated by the fire department.				$ 20,000	$25,000
	Establish an ambulance emergency communication system.	-100%	--	--	$ 1,000	$200
Sauk Rapids, MN	Implement intersection improvements at the IH-15/Benton Drive intersection.	--	Uncertain reduction	-35% (Vehicle accidents)	$800,000	$300
	Establish a volunteer rescue squad.				$ 25,000	$ 3,500
	Establish an ambulance/railroad emergency communication system.	100%	--	--	$ 1,000	$100
	Install gates and GCPs at the 2nd Avenue South, South Broadway, and 9th Street South crossings.	--	-2%	-60% (Vehicle accidents)	$270,000	$ 2,400

[a] These actions were selected for demonstration by the study Management Board at the February 7th and 8th, 1981, meetings in Moorhead, MN. Ernst and Ernst et al., Alternative Solutions to Railroad Impacts (St. Paul: Minnesota Department of Transportation, May 1979)

[b] The potential change in general vehicle delays is related to three priority problems identified by the communities: (1) community development restriction (development problems associated with restricted access to specific areas of the community); (2) difficulties in gaining access to work and school; (3) difficulties in gaining access to business and social activities

[c] This is the incremental cost associated with each action; e.g., the additional cost above and beyond current operation and maintenance (O&M) costs

[d] Subject to North Dakota Public Service Commission hearing

TABLE A3-6

POTENTIAL PROJECT AREA CROSSING IMPROVEMENT REQUIREMENTS BY SCENARIO, FOR PROPOSED ACTION, 2011

	NUMBER OF CROSSINGS THAT MAY REQUIRE UPGRADING[a]			
CROSSING IMPROVEMENT	NO NEW RAIL LINE	LOW SCENARIO	MEDIUM SCENARIO	HIGH SCENARIO
Crossbucks	1	4	4	4
Flashing Lights	3	5	5	6
Gates	-0-	-0-	-0-	-0-
Grade Separation	-0-	-0-	-0-	-0-
TOTAL	4	9	9	10
COST TO UPGRADE[b]	$275,000	$470,000	$470,000	$560,000

[a] Based on Montana Department of Highways criteria

[b] Assumes a cost per device of: CB = $ 5,000
FL = $ 90,000
G = $ 125,000
GS = $3,500,000

A3.1.3 Downline Operations

Traffic originating on the proposed TRRC rail line is destined to points well beyond Miles City, Montana. The first task in analyzing the railroad's potential impacts to other communities was to identify the downline corridors. The second step was to project current and future train traffic through these corridors, and to assess the ability of the existing rail lines to carry the increased TRRC-generated traffic. The analysis was then divided into three categories: (1) community impacts; (2) rural area impacts; (3) railroad impacts. A special category was established to analyze impacts to large, urban communities--i.e., those cities of over 50,000 population.

To determine the impact of TRRC trains on community activities and community development, the effects of TRRC trains were analyzed in relation to several points: (1) emergency service delays at crossings; (2) general vehicular delays at crossings; (3) expansion of railroad facilities. In rural areas, the analysis focused on crossing delays. For railroad impacts, those railroad capital improvements required to accomodate TRRC trains and the potential effect of TRRC trains were considered.

A3.1.3.1 Identification of Downline Corridors

Figure A3-2 presents the feasible routings of TRRC trains through downline corridors. Approximately one-third of the future TRRC traffic would be routed to markets on the West Coast via the Burlington Northern mainline. This analysis is based on the assumption that coal traffic will be routed along the mainline through Missoula, Montana, and Sandpoint, Idaho, to Spokane, Washington. Due to the number of possible alternate routings past Spokane, the downline analysis for transportation terminates at that community. A possible alternate routing through the community of Great Falls, Montana, does exist, but definite plans for upgrading that line to handle the coal traffic have not been announced. Rural crossing analysis conducted for downline communities could be applied to the northern route, should it be used.

The remaining two-thirds of the future TRRC traffic would be routed on the BN rail lines in either North or South Dakota to Minneapolis/St. Paul, and to Superior, Wisconsin.[10] As with the western route, train traffic will probably move beyond Minneapolis/St. Paul and Superior. The exact routings are not known and, therefore, the eastern downline corridor ends at these two cities.

A3.1.3.2 Existing and Potential Rail Traffic

Existing rail traffic on the Burlington Northern mainline includes two components: merchandise trains and unit coal trains. Projections for the two types of trains were developed independently and then combined to arrive at a total train projection. The train data for 1981 were provided by Burlington Northern Railroad Company.[11] To project merchandise trains, the historical growth rate for the period 1972-1979--a 0.6 percent increase per year--was used.[12] To project coal trains, several sources were required, such as: (1) Burlington Northern, Inc.; (2) existing and planned utility coal demand; (3) national and regional energy forecasts.[13] Since most forecasters project coal production only to 1990, estimates of coal flows for the period 1991-2011 were computed. These estimates are presented in Table A3-7, inclusive of trains originated by the TRRC.

Downline corridors were divided into 12 segments that designate those alternate routes to the downline corridor termini discussed previously. Projected TRRC traffic was assigned to each of these segments, based upon coal market data and upon rail line capacity data.[14] Traffic on some segments was allocated under two separate scenarios. The first scenario assumes that all eastbound traffic would traverse the BN line from Miles City to Casselton, North Dakota. From this point, non-Duluth-bound traffic would be split approximately two-to-one between the Casselton/Staples/Twin Cities line and the Casselton/Wilmar/Twin Cities line, respectively--i.e., 70 percent x 42 percent and 30 percent x 42 percent. The second scenario assumes that 30 percent of the coal transported from the Tongue River project area could be over the recently leased BN line through South Dakota.[15] The remaining 12 percent--eastbound, non-Superior and non-BN/South Dakota

TABLE A3-7

DOWNLINE TRAIN PROJECTIONS, TRAINS PER DAY, 1981-2011, MEDIUM PRODUCTION SCENARIO (Includes TRRC Trains)

SEGMENT	1981			1986			1991			1996			2001			2006			2011		
	C	O	T[a]	C	O	T	C	O	T	C	O	T	C	O	T	C	O	T	C	O	T
WEST																					
Miles City/Livingston	2	8	10	2	8	10	9	8	17	14	9	23	18	9	27	23	9	32	27	10	37
Livingston/Helena	1	10	11	1	11	12	12	12	24	21	12	33	28	13	41	34	13	47	41	13	54
Helena/Missoula	1	13	14	1	14	15	12	15	27	21	15	36	28	16	44	34	16	50	41	17	58
Missoula/Sandpoint	1	9	10	1	11	12	9	13	22	14	13	27	18	14	32	23	14	37	27	14	41
Sandpoint/Spokane	1	40	41	1	41	42	9	42	51	14	43	57	18	45	63	23	46	69	27	48	75
EAST																					
Miles City/Terry	10	6	16	15	6	21	19	6	25	25	7	32	30	7	37	35	7	42	41	7	48
Terry/Casselton	10	7	17	14	7	21	18	7	25	24	8	32	30	8	38	35	8	43	40	8	48
Casselton/Staples	8	22	30	12	23	35	16	25	41	22	26	48	26	27	53	31	28	59	36	29	65
Staples/Superior	2	2	4	4	2	6	6	2	8	8	2	10	9	2	11	11	2	13	12	2	14
Staples/Twin Cities	3	27	30	7	28	35	10	29	39	15	29	44	18	30	48	21	31	52	25	32	57
Casselton/Twin Cities	2	8	10	4	8	12	5	8	13	6	9	15	8	9	17	10	9	19	11	10	21
Terry/Twin Cities	1	3	4																1	3	4

[a] C = Coal Trains; O = Other Trains; T = Total Trains

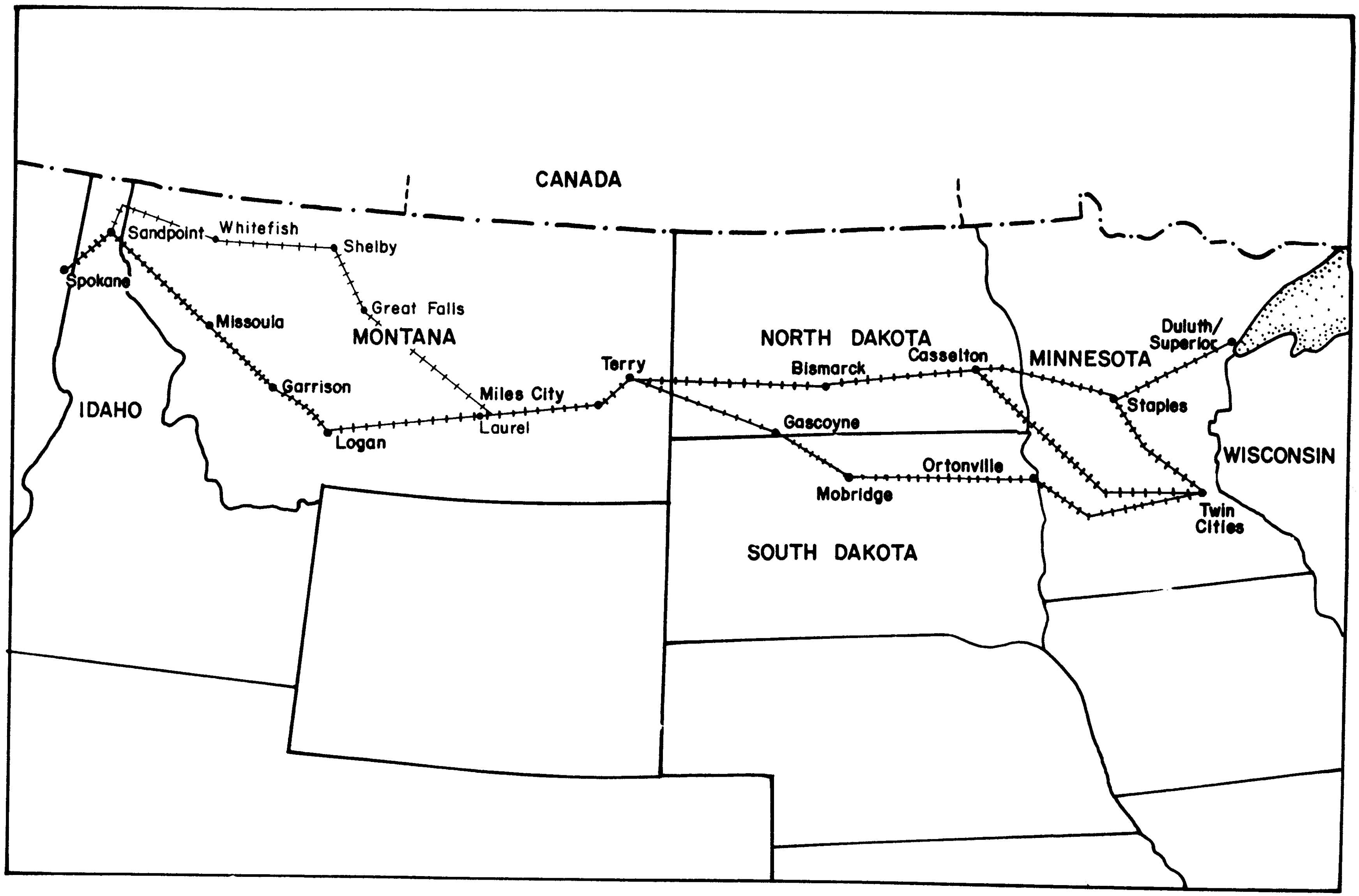


Figure A3-2. TRRC Downline Railroad Corridors

coal--would be routed on BN mainlines through North Dakota. No traffic projections were developed for the western downline northern route through Great Falls due to the speculative nature of that routing.

Using the distribution patterns described above and the amount of coal that would originate with the TRRC, the number of TRRC trains to be operated on each downline segment was calculated. The applied assumption was that TRRC trains would consist of 105 hopper cars, each carrying 96 tons of coal, and that the trains would operate 350 days a year. Tables A3-8 through A3-10 present the distribution of TRRC trains by coal production scenario.

A3.1.3.3 Ability of Lines to Absorb Expected Traffic Increases

The addition of the TRRC trains might necessitate the expansion of downline rail capacity. Three basic types of capital improvements may be required to provide that increased capacity: (1) signalization--centralized train control; (2) sidings; (3) parallel mainline tracking.

To determine the requirements for the additional trains, the analysis compared the current downline capacity, in trains per day, to the projected trains per day by downline segment. This comparison revealed locations where capacity expansion might be required. Capital improvements that would provide the estimated, additional capacity requirements were determined using the following standards, based on experience:

(1) If peak traffic divided by existing capacity is expected to be between 0.8 and 1.0, additional signalization will be required
(2) If the demand/capacity ration exceeds 1.0, additional sidings and mainline track will be required.

The estimated capital improvements were specified in terms of track miles. The costs associated with capacity expansion requirements were estimated using unit cost (per track mile) data. The capacity expansion costs associated with TRRC trains were estimated by determining the addition of that downline train volume attributable to TRRC trains.

Some downline segments, most of which are located west of Miles City, would require capital improvements by 1991 to accomodate projected train volumes. By 1991, a total of 580 track miles of improvements might be required to handle the TRRC and the other projected trains. Ninety-five percent of these improvements would entail the installation of centralized train control. By 2011, all but two downline segments would require capacity additions. By that time, an additional 1,250 track miles of improvements might be needed. Most of the segments would require additional siding construction and double track mainline installation. If the northern route through Great

TABLE A3-8

DOWNLINE DISTRIBUTION OF TRRC TRAINS
PROPOSED ACTION/LOW PRODUCTION SCENARIO[a]

DOWNLINE SEGMENT	NUMBER OF TRRC TRAINS PER DAY[b] 1986/87	1991	1996	2001	2006	2011
SCENARIO #1--No Trains Routed on BN South Dakota Line						
Miles City West						
Miles City/Livingston	<1	1	2	3	4	4
Livingston/Helena[c]	<1	2	3	4	6	8
Helena/Missoula[c]	<1	2	3	4	6	8
Missoula/Sandpoint	<1	1	2	3	4	6
Sandpoint/Spokane						
Miles City East						
Miles City/Terry	<1	2	5	7	8	13
Terry/Casselton	<1	2	5	7	8	13
Casselton/Staples	<1	2	4	6	7	11
Staples/Superior	<1	1	2	3	3	5
Staples/Twin Cities	<1	1	2	3	4	6
Casselton/Twin Cities	<1	<1	1	1	1	2
Terry/Twin Cities	-0-	-0-	-0-	-0-	-0-	-0-
TOTAL TRAINS PER DAY	1	3	7	10	12	19
SCENARIO #2--Traffic Split between BN South Dakota line (30%) and all other BN lines (70%)						
Miles City West						
Miles City/Livingston						
Livingston/Helena[c]	--------Same as Scenario #1----------					
Helena/Missoula[c]						
Missoula/Sandpoint						
Sandpoint/Spokane						
Miles City East						
Miles City/Terry	<1	2	5	7	8	13
Terry/Casselton	<1	1	3	4	4	7
Casselton/Staples	<1	1	3	4	4	6
Staples/Superior	<1	1	2	3	3	5
Staples/Twin Cities	<1	<1	1	1	1	1
Casselton/Twin Cities	<1	<1	<1	<1	<1	1
Terry/Twin Cities	<1	1	2	3	4	6
TOTAL TRAINS PER DAY	1	3	7	10	12	19

a The low production scenario assumes the following amount of coal transported by TRRC trains: 1986/87, 3 million tons (mt); 1991, 6 mt; 1996, 13 mt; 2001, 18 mt; 2006, 22 mt; 2011, 33 mt

b Includes loaded and empty trains; the number of trains is rounded to the nearest train

c Loaded trains moving west on this segment must be divided into two units to traverse the mountains

TABLE A3-9

DOWNLINE DISTRIBUTION OF TRRC TRAINS
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO[a]

DOWNLINE SEGMENT	NUMBER OF TRRC TRAINS PER DAY[b] 1986/87	1991	1996	2001	2006	2011
SCENARIO #1--No Trains Routed on BN South Dakota line						
Miles City West						
Miles City/Livingston	<1	1	3	5	6	7
Livingston/Helena[c]	<1	2	4	6	8	10
Helena/Missoula[c]	<1	2	4	6	8	10
Missoula/Sandpoint	<1	1	3	5	6	7
Sandpoint/Spokane						
Miles City East						
Miles City/Terry	<1	2	5	9	12	15
Terry/Casselton	<1	2	5	9	12	15
Casselton/Staples	<1	2	4	7	10	12
Staples/Superior	<1	1	2	4	5	6
Staples/Twin Cities	<1	1	2	3	5	6
Casselton/Twin Cities	<1	<1	1	2	2	3
Terry/Twin Cities	-0-	-0-	-0-	-0-	-0-	-0-
TOTAL TRAINS PER DAY	1	3	8	14	18	22
SCENARIO #2--Traffic Split between BN South Dakota line (30%) and all other BN lines (70%)						
Miles City West						
Miles City/Livingston						
Livingston/Helena[c]	--------Same as Scenario #1----------					
Helena/Missoula[c]						
Missoula/Sandpoint						
Sandpoint/Spokane						
Miles City East						
Miles City/Terry	<1	2	5	9	12	15
Terry/Casselton	<1	1	3	5	7	8
Casselton/Staples	<1	1	3	5	6	7
Staples/Superior	<1	1	2	4	5	6
Staples/Twin Cities	<1	<1	1	1	1	1
Casselton/Twin Cities	<1	<1	<1	<1	<1	1
Terry/Twin Cities	<1	1	2	4	5	7
TOTAL TRAINS PER DAY	1	3	8	14	18	22

[a] The medium production scenario assumes the following amount of coal transported by TRRC trains: 1986/87, 3 million tons(mt); 1991, 6 mt; 1996, 15 mt; 2001, 25 mt; 2006, 31 mt; 2011, 38 mt

[b] Includes loaded and empty trains; the number of trains is rounded to the nearest train.

[c] Loaded trains moving west on this segment must be divided into two units to traverse the mountains.

TABLE A3-10

DOWNLINE DISTRIBUTION OF TRRC TRAINS
PROPOSED ACTION/HIGH PRODUCTION SCENARIO[a]

DOWNLINE SEGMENT	NUMBER OF TRRC TRAINS PER DAY[b] 1986/87	1991	1996	2001	2006	2011
SCENARIO #1--No Trains Routed on BN South Dakota line						
Miles City West						
Miles City/Livingston	<1	2	3	6	8	8
Livingston/Helena[c]	<1	3	4	8	12	12
Helena/Missoula[c]	<1	3	4	8	12	12
Missoula/Sandpoint	<1	2	3	6	8	8
Sandpoint/Spokane						
Miles City East						
Miles City/Terry	<1	3	7	13	17	17
Terry/Casselton	<1	3	7	13	17	17
Casselton/Staples	<1	3	6	11	14	14
Staples/Superior	<1	1	3	5	6	6
Staples/Twin Cities	<1	2	3	6	8	8
Casselton/Twin Cities	<1	<1	1	2	3	3
Terry/Twin Cities	-0-	-0-	-0-	-0-	-0-	-0-
TOTAL TRAINS PER DAY	1	5	10	19	25	25
SCENARIO #2--Traffic Split between BN South Dakota line (30%) and all other BN lines (70%)						
Miles City West						
Miles City/Livingston	--------Same as Scenario #1----------					
Livingston/Helena[c]						
Helena/Missoula[c]						
Missoula/Sandpoint						
Sandpoint/Spokane						
Miles City East						
Miles City/Terry	<1	3	7	13	17	17
Terry/Casselton	<1	2	4	7	9	9
Casselton/Staples	<1	2	4	6	8	8
Staples/Superior	<1	1	3	5	6	6
Staples/Twin Cities	<1	<1	1	1	2	2
Casselton/Twin Cities	<1	<1	<1	1	1	1
Terry/Twin Cities	<1	1	3	6	8	8
TOTAL TRAINS PER DAY	1	5	10	19	25	25

a The high production scenario assumes the following amount of coal transported by TRRC trains: 1986/87, 3 million tons (mt); 1991, 9 mt; 1996, 17 mt; 2001, 34 mt; 2006, 44 mt; 2011, 44 mt

b Includes loaded and empty trains; the number of trains is rounded to the nearest train

c Loaded trains moving west on this segment must be divided into two units to traverse the mountains

Falls downline to the west were used, it is likely that a considerable upgrading effort would be required.

Based upon unit cost figures, the cost to provide the additional downline capacity is estimated at $111 million by 1991. An additional investment of $630 million may be needed between 1991 and 2011. Of this total amount, 35 percent can be attributed to the addition of the TRRC trains, as shown in Table A3-11. Yet, the apportionment of this capital cost to the TRRC and to other railroad companies oversimplifies true attribution of costs, because the improvements for capacity expansion are a function of total traffic.

TABLE A3-11

COST ALLOCATION FOR CAPACITY ADDITIONS[a]
(Millions 1980$)

YEAR	TOTAL COST	COST ATTRIBUTABLE TO TRRC TRAINS	
1991	$111	$ 24	22%
2011	$630	$234	37%
TOTAL	$741	$258	35%

[a] Peat, Marwick, Mitchell & Co., July 28, 1981

The recently acquired BN South Dakota line currently needs substantial rehabilitation to continue in operation. If the line is rehabilitated as currently planned, it would not require any additional capacity to accommodate the potential TRRC traffic, which would be seven trains per day by 2011. Some traffic assumed to be routed on the BN North Dakota line could be routed on a rehabilitated line, which might reduce the overall, downline capacity expansion costs.

A3.1.3.4 Impacts from Additional Train Traffic

Prior to discussing the impacts of additional trains, the communities in which these impacts would occur were identified. Downline communities are cities and districts located adjacent to, or divided by, one of the downline mainlines.[16] Communities were categorized into four classes, according to their population. Figure A3-3 shows the distribution of downline communities by line segment and by population class. Since the BN routing options differ with respect to the number and the population characteristics of affected downline communities, the impact of the TRRC trains would differ. These differences are recognized in the impact analysis and are presented in Table A3-12.

TABLE A3-12

NUMBER OF COMMUNITIES POTENTIALLY AFFECTED BY TRRC OPERATIONS BY DOWNLINE SEGMENT

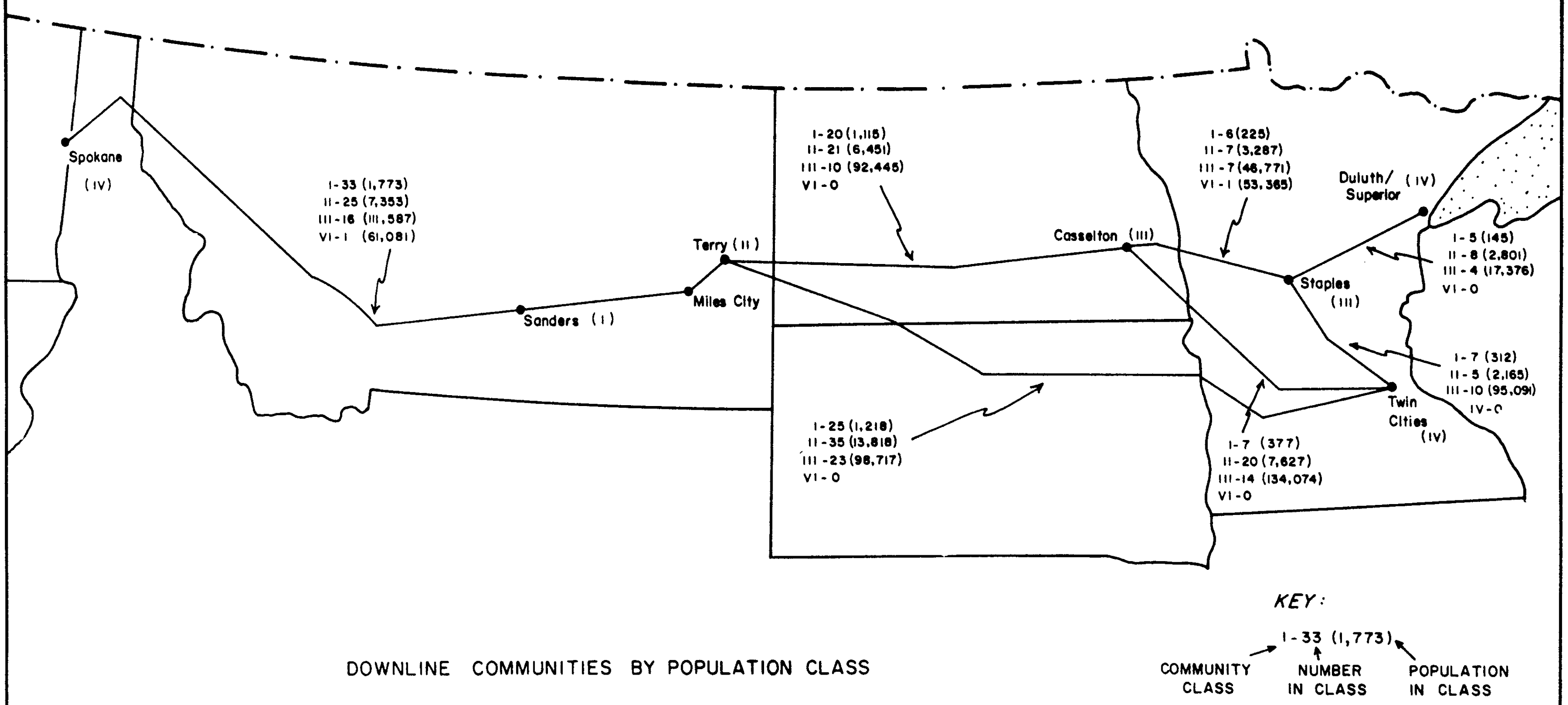
SEGMENT	NO. OF COMMUNITIES/TOTAL POPULATION BY CLASS[b] I	II	III	IV	TOTAL, ALL CLASSES
EAST					
Terry/Twin Cities	25/1,218	35/13,818	23/98,717	-0-	83/113,753
Terry/Casselton	20/1,115	21/6,451	10/92,445	-0-	51/100,011
Casselton/Staples[c]	6/225	7/3,287	7/46,771	1/53,365	21/103,648
Casselton/Twin Cities	7/377	20/7,627	14/134,074	-0-	41/142,078
Staples/Twin Cities	7/312	5/2,165	10/95,091	-0-	22/97,568
WEST					
Miles City/Spokane[c]	33/1,773	25/7,353	16/111,587	1/61,081	75/181,794

[a] If the BN South Dakota line is not used, only communities on the BN (Terry to Casselton, Casselton to Twin Cities, Casselton to Staples, and Staples to Twin Cities) would be affected. With the use of the southern line, all communities on the BN still would be affected, since trains will continue to operate on these lines; additionally, communities on the southern line would be affected

[b] Excludes terminus communities. Community classes are a function of population, as follows:

I -- less than 100
II -- 100 to 999
III -- 1,000 to 49,999
IV -- more than 50,000

[c] Only one routing alternative has been examined for the western downline corridor



DOWNLINE COMMUNITIES BY POPULATION CLASS

CLASS (POPULATION)	I (0-99)	II (100-999)	III (1,000-49,999)	IV (≥ 50,000)	TOTAL
NUMBER	104	122	86	5	317
AVERAGE POPULATION	50	364	7,209	200,570	5,200

NOTE: EXCLUDES THOSE COMMUNITIES WITHIN THE THREE-COUNTY PROJECT AREA

Figure A3-3. Distribution of Downline Communities by Line Segment and Population Class

Because of the large number of communities located on the various downline corridors, a representative sample of these communities, randomly designated, was selected for the analysis. Excluded from the sample were communities with less than 100 residents and cities with populations of more than 50,000--i.e., Billings, Montana; Superior, Wisconsin; Fargo, North Dakota; Moorhead, Minnesota; the Twin Cities; and Spokane, Washington.[17] The impacts to these larger, urbanized areas were analyzed separately. Four categories of downline communities were established for sampling:

(1) Downline communities with populations between 100 and 999, divided by a mainline
(2) Downline communities with populations between 100 and 999, adjacent to a mainline
(3) Downline communities with populations between 1,000 and 50,000, divided by a mainline
(4) Downline communities with populations between 1,000 and 50,000, adjacent to a mainline

Table A3-13 lists the 39 communities randomly selected for this stratified sample.

To obtain data required for the analysis, telephone interviews were conducted with representatives of the designated communities. Data regarding train operations within each community were obtained from Burlington Northern, Inc. and from the Milwaukee Road.[18]

Increased Delay at Grade Crossings: Emergency Service Vehicles

The assessment of increased delays at grade crossings included delays to emergency service vehicles and to general vehicles. To estimate the number of emergency calls delayed in a year, it was necessary to estimate the probability of motor vehicle delay at grade crossings in each community and the expected number of emergency vehicle crossings during the year. The probabiliy of delay equals the expected blocked-crossing time per day, in minutes, divided by the number of minutes in a day. The expected blocked-crossing time per day is a function of the length, the speed, and the number of expected daily trains at each crossing and equals:

$$(ADTT)\ (L + 3000')/S$$

In this equation:

ADTT = Average daily train traffic
L = Train length
S = Train speed, in feet per minute
3000' = typical distance between a crossing and that crossing's signal activation circuits[19]

TABLE A3-13

COMMUNITIES SELECTED FOR SAMPLE

1 CLASS II-D[a] NAME OF COMMUNITY	POPULATION 1980	 1970
Rice, MN	500	366
Kerkhoven, MN	763	641
Manhatten, MT	987	816
New York Mills, MN	973	791
Sagle, ID	100	100
Clontarf, MN	250	147
Waubay, SD	673	696
Tintah, MN	118	118
Frenchtown, MT	250	100
Drummond, MT	492	494
Tappen, ND	300	294
Cologne, MN	543	518
Athol, ID	360	190

3 CLASS III-D[a] NAME OF COMMUNITY	POPULATION 1980	 1970
Belfield, ND	1,300	1,130
Missoula, MT	33,000	29,800
Benson, ND	3,700	3,549
Olivia, MN	2,773	2,553
Anoka, MN	15,541	13,489
Morris, MN	5,376	5,366
Jamestown, ND	16,281	15,385
Milbank, SD	4,180	3,727

2 CLASS II-A[a] NAME OF COMMUNITY	POPULATION 1980	 1970
Kindred, ND	569	495
Custer, MT	340	250
Bluffton, MN	205	195
Bowdle, SD	650	667
Doran, MN	100	101
Clinton, MT	100	160
Tamarack, MN	100	100
Marmarth, ND	198	247
Donnelly, MN	313	252
Reeder, ND	360	306

4 CLASS III-A[a] NAME OF COMMUNITY	POPULATION 1980	 1970
Webster, SD	2,400	2,252
Lemmon, SD	1,865	1,997
Hettinger, ND	1,738	1,655
Bird Island, MN	1,400	1,309
Appleton, MN	1,842	1,789
Sandpoint, ID	4,459	4,144
Mobridge, SD	4,168	4,545
East Helena, MT	1,649	1,651

[a] Class designation is as follows:

- Class II-D -- 99 < Community Population <1000; Community divided by rail line
- Class II-A -- 99 < Community Population <1000; Community adjacent to rail line
- Class III-D--999 < Community Population <50,000; Community divided by rail line
- Class III-A--999 < Community Population <50,000; Community adjacent to rail line

The expected number of emergency service crossings was derived for each community from estimates of the number of emergency calls, from the distribution of those calls, and from the logistics of the emergency response system. The average per vehicle duration of delay was considered to be one-half of the expected blocked-crossing time per train.

With estimates of the probability of delay at crossings (P), and the number of emergency calls (C) and emergency crossings made each year, the potential number of crossing delays (ED) was calculated with the equation:

$$ED = (P)(C)$$

The estimated percentage of calls delayed also was calculated.

Using a figure of 10 trains per day, emergency service delays were estimated for each sample community and then averaged for each community category. These delay factors, presented in Table A3-14, represent the effect of 10 unit coal trains per day on the average community within each category. To estimate the effect of the TRRC trains on the average downline community's emergency services, the factors shown in Table A3-14 were adjusted according to the number of projected TRRC trains, by downline corridor segment and by year.

Emergency service delays, calculated by the above methods, are presented in Table A3-15, which lists ambulance service delays in downline communities, and in Table A3-16, which lists fire service trips delayed. If TRRC trains were routed only over the BN North Dakota line, the responses to medical emergencies, in 2011, would be delayed no more than 6 percent of the time in the average community. In more than 80 percent of the sample communities, the responses would be delayed less than 3 percent of the time. In earlier years, involving fewer TRRC trains, the percentage of medical emergency service delays is considerably lower. The maximum percentage of delay experienced by an average community is 1 percent in 1986/1987, 2 percent in 1991, and 4 percent in 2001. Regardless of the year or the coal production scenario, the range for the average duration of delayed trips would be 1.3 to 1.7 minutes, and is not affected by the number of trains.

If the BN South Dakota line were used by some of the TRRC trains, more communities would experience emergency service delays. However, with the dispersion of the TRRC trains along more mainlines, the percentage of medical emergency trips delayed would be smaller. In 2011, none of the average communities would experience delays to more than 3 percent of their medical emergency response trips.

In 2011, no more than 3 percent of the fire service responses would be delayed, if trains were routed on the BN North Dakota line. If the South Dakota line were used, the maximum percentage of delayed response trips would be 2 percent. In 1986/1987 and in 1991, the percentage of delayed fire service trips would not exceed 1 percent. The

TABLE A3-14

EMERGENCY SERVICE DELAY FACTORS ASSUMING 10 UNIT COAL TRAINS PER DAY
(minutes)

COMMUNITY CATEGORY	AMBULANCE % OF TRIPS DELAYED	AMBULANCE AVERAGE DURATION OF DELAY/ VEHICLE	FIRE % OF TRIPS DELAYED	FIRE AVERAGE DURATION OF DELAY/ VEHICLE
1-Divided by rail line; population between 100 and 999 (28% of downline communities)	3.7	1.3	2.0	1.3
2-Adjacent to rail line; population between 100 and 999 (30% of downline communities)	2.8	1.5	1.9	1.5
3-Divided by rail line; population between 1,000 and 50,000 (32% of downline communities)	1.4	1.5	1.6	1.5
4-Adjacent to rail line; population between 1,000 and 50,000 (10% of downline communities	1.0	1.7	0.5	1.7

[a] The figure refers to the percentage of downline communities in each category that was studied.

average duration per delayed crossing among the sample communities would range from 1.3 to 1.7 minutes.

The emergency service results in Tables A3-15 and A3-16 are based upon the medium coal production scenario. The high scenario would result in approximately 32 percent more delays than would the medium production scenario; approximately 18 percent fewer delays would be experienced under the low scenario. It should be noted that the emergency services in some downline communities are able to use grade-separated crossings. Consequently, in these communities, no impact from TRRC trains is anticipated.

A qualification of this analysis of downline emergency service delays is that the analysis is based upon statistics for the average community. Some communities would experience a number delays either higher or lower than those shown delays indicated by the tables. The "worst case" situation would be the community in which 11 percent of

TABLE A3-15

DOWNLINE COMMUNITY AMBULANCE SERVICE DELAYS RESULTING FROM TRRC TRAINS

PERCENTAGE OF TRIPS DELAYED	NUMBER OF COMMUNITIES BY YEAR[a] 1986/87	1991	2001	2011	BN SOUTH DAKOTA ROUTING ONLY 2011
0.0	58[b]	58	58	58	58
0.1 - 1.0	150	135	77	54	110
1.1 - 2.0	-0-	15	47	39	51
2.1 - 3.0	-0-	-0-	15	28	47
3.1 - 4.0	-0-	-0-	11	3	-0-
4.1 - 5.0	-0-	-0-	-0-	15	-0-
5.1 - 6.0	-0-	-0-	-0-	11	-0-
TOTAL	208	208	208	208	266

[a] Includes only those communities with populations of 100 to 49,999 people. Communities under 100 people will experience a negligible effect. Communities with populations of 50,000 or more are treated separately. Impact estimates are based upon the medium production scenario. The second column titled "2011" represents the effect of routing 30 percent of the TRRC trains on the BN South Dakota line from Miles City to the Twin Cities

[b] These communities are located along the BN South Dakota rail line

the medical emergency response trips would be delayed, because of 15 TRRC trains passing through the community each day. Overall, however, the percentage range of delayed emergency trips, among sample communities, would not be large. In 90 percent of the cases, the deviation from the mean percentage for each community category would not exceed 1 or 2 percent, assuming 10 TRRC trains per day.

A second qualfication of this analysis is that the estimated percentage of delayed emergency service responses represents a ceiling level for the average community. This results because it was assumed that each projected delay occurrs on a different emergency call. In reality, some calls may be delayed more than one time. Insofar as multiple delays are experienced by single calls, the percentage of calls delayed will be less than the estimate shown in the tables.

As a final qualification of this analysis, the implications of the possible delays to emergency services might have been considered. For fire emergencies, the possible consequences of delay--such as additional property loss because a fire was not contained earlier--can be identified. However, an estimate of the consequences of delayed medi-

TABLE A3-16

DOWNLINE COMMUNITY FIRE SERVICE DELAYS RESULTING FROM TRRC TRAINS

PERCENTAGE OF TRIPS DELAYED	NUMBER OF COMMUNITIES BY YEAR[a]				BN SOUTH DAKOTA ROUTING ONLY
	1986-87	1991	2001	2011	2011
0.0	58[b]	58	58	58	58
0.1 - 1.0	150	150	106	56	67
1.1 - 2.0	-0-	-0-	44	56	141
2.1 - 3.0	-0-	-0-	-0-	38	-0-
3.1 - 4.0	-0-	-0-	-0-	-0-	-0-
4.1 - 5.0	-0-	-0-	-0-	-0-	-0-
5.1 - 6.0	-0-	-0-	-0-	-0-	-0-
TOTAL	208	208	208	208	266

a Includes only those communities with populations of 100 to 49,999 people. Communities under 100 people will experience a negligible effect. Communities with populations of 50,000 or more are treated separately. Impact estimates are based upon the medium-production scenario and the BN-only routing. The second column titled "2011" represents the effect of routing 30 percent of the TRRC trains on the BN South Dakota line from Miles City to the Twin Cities

b These communities are located along the BN South Dakota rail line

cal services is more complex, since those consequences depend upon the patient's condition, as well as upon the amount of time that already has elapsed prior to treatment. Further, the patient's location relative to the emergency medical service location is important. Because of these complexities, the consequences of emergency medical service delays were not estimated.

General Vehicle Delays in Communities

The method used to estimate general vehicle delays in communities is similar to that approach employed in determining emergency service delays. The following estimates, for the same sample communities, were developed: (1) the expected number of vehicles delayed, per year, in 5-year increments from 1986/87 through 2011; (2) the average duration of delay per vehicle; (3) the expected percentage of vehicle trips delayed. Conclusions then were drawn regarding the entire downline community population. The same basic formula used to calculate emergency service delays was used to calculate general vehicle delays. For any given community, the expected number of vehicles delayed annually can be expressed by the equation:

$$V = (P)\ (ADHT)\ (365 \text{ days per year})$$

In this equation, V = the expected number of vehicles delayed in a given year; P = the probability of delay at grade crossings in the community; ADHT = the average daily highway traffic at grade crossings in the community.

Average daily highway traffic (ADHT) data were obtained from the latest printout of the Federal Railroad Administration and from the Grade Crossing Inventory, which relies on individual state highway departments for its automobile traffic data, supplemented by information obtained from community surveys.[20] Average daily highway traffic projections for future years were based upon population growth estimates, which also were developed from survey data. The average per vehicle duration of delay was considered to be one-half of the expected blocked-crossing time per train. To estimate the percentage of delayed vehicle trips, the expected number of vehicles that would be delayed annually in each community was divided by the expected number of annual trips taken within that community.[21] Factors then were developed to represent the level of general vehicular delay, for the average community in each community category, based on 10 trains per day. To estimate the effect of the TRRC trains on vehicular delay in these communities, the delay factors were adjusted to reflect the projected TRRC train traffic.

The results of this method of estimating vehicle delays in the sample communities are presented in Table A3-17; they pertain to the medium coal production scenario. Not until 2011 would the TRRC trains cause delays to more than 3 percent of the one-way trips made in an average downline community. Before 2011, most communities would experience trip delays of 1 percent or less. The expected average delay per trip ranges from 1.3 minutes to 1.7 minutes. Although the TRRC trains may inconvenience travelers, these delays would not be sufficient to result in the isolation of neighborhoods or in new community development patterns. The percentage of vehicles delayed would be 18 percent lower under the low production scenario and 32 percent higher under the high production scenario. If some trains were routed on the BN South Dakota line, more downline communities would be affected, but the average effect on each community would be less.

Since these general vehicle results are estimates for the average community, some communities would experience either more or less trip delays than those delays shown in Table A3-17. Among these communities, the range in the percentage of trips delayed would not exceed 1.5 percent of each category's average in 90 percent of the cases.

General Vehicle Delays at Rural Crossings

The same kinds of estimates and methods used to calculate vehicle delays in communities were employed to assess general vehicle delays at rural crossings. For the calculation of the equation--V=(P)(ADHT) (365 days per year)--the 1980 rural-crossing ADHT data were obtained

TABLE A3-17

DISTRIBUTION OF DOWNLINE COMMUNITIES BY PERCENTAGE OF ONE-WAY TRIPS DELAYED BY TRRC TRAINS

PERCENTAGE OF TRIPS DELAYED	NUMBER OF COMMUNITIES BY YEAR[a] 1986-87	1991	2001	2011	BN SOUTH DAKOTA ROUTING ONLY 2011
0.0	58[b]	58	58	58	58
0.1 - 1.0	150	150	139	106	197
1.1 - 2.0	-0-	-0-	11	33	11
2.1 - 3.0	-0-	-0-	-0-	11	-0-
3.1 - 4.0	-0-	-0-	-0-	-0-	-0-
4.1 - 5.0	-0-	-0-	-0-	-0-	-0-
5.1 - 6.0	-0-	-0-	-0-	-0-	-0-
TOTAL	208	208	208	208	266

a Includes only those communities with populations of 100 to 49,999 people. Communities under 100 people will experience a negligible effect. Communities with populations of 50,000 or more are treated separately. Impact estimates are based upon the medium coal production scenario and the BN North Dakota routing. The second column titled "2011" represents the effect of routing 30 percent of the TRRC trains on the BN South Dakota line from Miles City to the Twin Cities

b The communities are located on the BN South Dakota rail line

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for each of the downline segments from the Federal Railroad Administration's <u>Grade Crossing Inventory</u>.[22] The ADHT volumes for future years were determined by multiplying the 1980 crossing figures by the average, estimated population growth rate for the 39 sample communities.

The probability of delay for each of the downline segments was based upon the number of the TRRC trains anticipated on each segment and upon an average train speed of 40 mph. The projected number of delayed vehicles was calculated for each segment and then totaled to determine an annual delay figure for all of the downline rural crossings.

In addition, the expected percentage of delayed trips on each segment was estimated. This percentage is equal to the probability of delay on that segment. The expected percentage of delayed trips for all rural crossings is the total of all delayed vehicles divided by the total ADHT for all grade crossings.

Table A3-18 presents the estimates for delays at rural crossings. Assuming the routing of all traffic on the Burlington Northern North Dakota line, and the medium coal production scenario, the expected number of delays is projected to increase from 27,500 vehicles in 1986/1987 to 869,500 in 2011. The high production scenario would result in 32 percent more delays, and the low production scenario would cause 18 percent fewer delays. Whereas the absolute number of vehicles delayed by the TRRC trains appears large, the effect of the TRRC trains on rural travel would be quite small. In 1986/1987, the percentage of rural trips, using downline crossings, that may be delayed by the TRRC trains is only 0.1 percent. In 2011, that percentage would increase to 1.5. The average duration of delay is expected to be only 1.25 minutes.

TABLE A3-18

VEHICLE DELAY ESTIMATES FOR DOWNLINE RURAL CROSSINGS

	TRRC TRAINS			TOTAL TRAINS
YEAR	VEHICLES DELAYED	% OF ADHT	AVERAGE DURATION OF DELAY (Minutes)	% OF ADHT DELAYED
1986/87	27,500	0.1	1.25	4.6
1991	182,500	0.4	1.25	4.8
1996	277,000	0.6	1.25	4.9
2001	488,000	0.9	1.25	5.5
2006	681,500	1.2	1.25	6.0
2011	869,500	1.5	1.25	6.6

If some TRRC trains were routed on the BN South Dakota line, the number of general vehicles delayed would be smaller--e.g., 7 percent smaller in 2001. On the other hand, the expected percentage of all delayed trips would be slightly higher--1.5 percent compared to 0.9 percent--than if the routing involved only the BN North Dakota line.

Impact to Large Urban Areas

Impacts to urban areas--i.e., cities of more than 50,000 population--from the TRRC trains were assessed for the following communities: (1) Spokane, Washington; (2) Billings, Montana; (3) Duluth, Minnesota/Superior, Wisconsin; (4) Minneapolis/St. Paul, Minnesota; (5) Fargo, North Dakota/Moorhead, Minnesota. Telephone interviews with community experts in the above areas (1) through (4) were used to collect data. In the case of the fifth urban area, Fargo/Moorhead, data were obtained from the previous work conducted in the area by the firm of Ernst and Whinney.

All of the five downline urban areas, except Minneapolis, are experiencing significant railroad/community conflicts. In the Duluth/

Superior area, these existing conflicts do not apply to the line that would be used by the TRRC trains. The line that would carry the TRRC trains is one of the few lines in the area with grade-separated crossings. The two crossings that account for more than 90 percent of the major arterial traffic across this rail line are grade-separated.

In Billings, Fargo/Moorhead, and Spokane, the TRRC trains would add to long term difficulties. The Fargo/Moorhead area would experience the most serious problems. Without the construction of grade-separated crossings or without other actions to circumvent crossing delays, emergency service problems and general accessibility problems are likely to occur in Fargo/Moorhead as the train volume increases. These accessibility problems could result in the further deterioration of the Moorhead central business district and in the separation of the community's segments by the Burlington Northern mainlines. A large urban renewal project in the central business district has proven less than successful, according to city officials and residents, because of increasing rail operations. The TRRC trains would contribute little to these problems in the near future--e.g., TRRC trains would represent only 4 percent of all trains by 1991. However, by 2011, the TRRC trains would comprise almost 20 percent of the rail traffic through the area.[23]

Although Spokane faces considerable railroad/community conflicts, it would not seriously be affected by the TRRC trains. Four percent of the trains in 1991 and 9 percent of the trains in 2011 would be TRRC trains.

City planners in Billings report that train operations in that community contribute to community development problems.[24] However, the 1991 projected train volume in Billings--17 trains per a day, 1 of which would be a TRRC train--is not sufficient to cause major accessibility or community development problems. By 2011, the projected 37 trains per day--7 of which would be TRRC trains--would create crossing delays near the central business district and could cause community development problems.[25]

The TRRC trains are not expected to cause adverse impacts in the Minneapolis area. Almost all of the vehicular crossings of both of the BN lines are grade separated. One potential conflict might occur in Minneapolis, involving the possible expansion of a large urban park on Nicolet Island, where the Burlington Northern line from Casselton crosses the Mississippi River. If the size of the current park is increased, the Burlington Northern line will transect the park, which may result in noise, safety, and aesthetic conflicts.

If the BN South Dakota routing to Minneapolis is used, a somewhat higher degree of impact than that for the BN North Dakota line would be experienced. Crossings on the former line are not fully grade separated, although a number of grade separations exist in the more populated areas. These grade-separated crossings would help to mitigate both general and emergency service delays. The potential for future railroad/community conflict also exists in an area along the Lake Street corridor, near Lake Calhoun, for this district currently is experiencing significant residential development.

A3.1.3.5 Mitigative Measures

Grade-crossing conflicts between vehicles and trains can be mitigated by installing grade-crossing improvements. Estimates were prepared of the number, the type, and the cost of such crossing protection improvements, which would be required by the addition of TRRC trains to the downline corridors.[26] The following criteria were adopted for determining those necessary crossing improvements associated with TRRC trains:

(1) If the addition of the TRRC trains requires the construction of a double track mainline, the installation of automatic gates is warranted. (Continuous double-tracking usually is required when the average daily train volume exceeds 65 trains.) In this case, the only over-riding criterion is #2.

(2) A grade-separated crossing should be constructed: at urban crossings where the State of Montana's hazard index exceeds 20,000; at rural crossings where the hazard index exceeds 2,000. (The application of the hazard index is presented in Table A3-19.)

(3) For all other crossings, improvement requirements are determined by the Nebraska grade-crossing criteria presented in Table A3-20.

TABLE A3-19

MONTANA CRITERIA FOR URBAN GRADE-CROSSING IMPROVEMENTS

IF HI =	CROSSING PROTECTION WARRANTED IS:[a]
<2,000	Crossbucks
2,000 - 10,000	Flashing Lights
10,000 - 20,000	Gates
>20,000	Grade Separation

[a] Rural warrants are one-tenth of urban warrants--e.g., an HI of <200 warrants crossbucks at a rural crossing: $HI = (ADHT)(ADTT)(S\ F_i)/100$

In this equation: HI = hazard index;
ADHT = average daily highway traffic
ADTT = average daily train traffic
F_i = factors that describe various physical conditions at the crossing site. An average value for SF_i of 4.4 was calculated from a sample of crossings and was confirmed as reasonable by the Montana Department of Highways.

TABLE A3-20

NEBRASKA CRITERIA FOR GRADE-CROSSING IMPROVEMENTS

HIGHWAY SYSTEM	GRADE SEPARATION	AUTOMATIC GATES WITH FLASHING LIGHTS	FLASHING LIGHTS
Rural	EF[a] > 35,000	EF > 12,500	EF > 2,250
Urban	EF > 75,000	EF > 25,000	EF > 4,000

a EF = exposure factor--i.e.: (trains) x (daily auto traffic) These factors represent averages for the class of crossings presented in the Nebraska study

After establishing the crossing improvement criteria, a random, stratified sample of 50 urban and 50 rural downline crossings was selected.[27] Improvements warranted at each sample crossing were determined, including and excluding the TRRC trains. The difference between these calculations established those improvements attributable to the addition of the TRRC trains.[28]

The addition of the TRRC trains under the medium coal production scenario may increase the number of downline crossings that require upgrading by 10 percent within the next 30 years. Most of these improvements would entail the upgrading of warning devices at crossings, although the construction of some grade separations also may be warranted. Table A3-21 presents the estimated costs for these improvements.

Other, lower cost actions can be effective in reducing railroad/community conflicts. Such actions include establishing emergency communication systems, modifying rail sidings, improving highway intersections, and changing signal systems. These actions have proven effective in reducing crossing delays by as much as 30 percent and emergency service delays by as much as 100 percent.[29]

A3.1.4 Related Actions

Growth in project area population associated with the proposed TRRC railroad and with the related actions (the construction and operation of five surface coal mines) would increase traffic volumes on area highways. New highways would not be needed to meet this expanded population. However, current highways might require such improvements as paving, widening, realigning, and structural enhancement. The type of improvements required would depend upon the current highway condition and upon the increases in traffic.

TABLE A3-21

PERCENTAGE OF DOWNLINE CROSSINGS
THAT MAY REQUIRE CROSSING IMPROVEMENTS BY 2011

CROSSING PROTECTION	NON-TRRC TRAINS	TRRC TRAINS SCENARIO LOW	MEDIUM	HIGH	TOTAL TRAINS
Crossbucks	1	--	--	--	1
Flashing Lights	13	3	3	3	16
Automatic Gates	13	4	5	11	17-24
Grade Separation	3	2	2	2	5
TOTAL PERCENTAGE	30%	9%	10%	16%	39-46%
TOTAL NUMBER	445	140	150	245	595-690
Cost (millions)					
Cumulative	$180.2	$116.7	$118.0	$129.3	$296.7-$309.5
Annual	$ 6.7	$ 4.3	$ 4.4	$ 4.8	$11.0-$11.5

A3.1.4.1 Traffic Projections

To determine the increases in traffic attributable to the proposed railroad and to the related actions, projections were divided into two categories--work trips and other trips. Work trip projections were estimated on the basis of the locations of the coal mines and of the residential location of the mines' employees. Other trips, projected from current traffic volumes and from the anticipated population change, were added to the work trip total.

The following highway segments would experience the largest traffic increases:

(1) FAP 39, Colstrip to Lame Deer
(2) FAP 37, Lame Deer to Ashland and Ashland to Broadus
(3) FAS 447, Ashland to Mine #4
(4) FAS 484, US 212, to Mines #2 and #3
(5) FAS 566, Ashland to Mine #1
(6) Unnumbered road, Ashland to Mine #5

These highway segments would be affected most because: (1) they are the transportation links joining those areas that would experience the largest impact population increases; and (2) because they are the highways that would be used by mine workers for work trips. Table

A3-22 presents the traffic increases projected for each highway segment during selected years, under the medium production scenario. During the period 1984-2011, the low production scenario's projected traffic volumes would be 15 percent less than those volumes under the medium scenario. Under the high production scenario, the medium scenario volumes would be increased by 30 percent. The traffic volumes would differ only marginally among the rail line alternatives, because the traffic volume increases are attributable predominantly to population and to employment associated with the coal mines.

TABLE A3-22

CURRENT AND PROJECTED TRAFFIC VOLUMES, 1980-2011
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO

	AVERAGE DAILY HIGHWAY TRAFFIC			
HIGHWAY SEGMENT	1980	1991	2001	2011
FAP 39				
I-94 to Colstrip	1,200	998	1,466	1,630
Colstrip to Lame Deer	560	557	985	1,280
FAP 37				
Lame Deer to Ashland	940	1,437	2,488	2,910
Ashland to Otter Creek Road (FAS 484)	740	860	2,481	3,520
Otter Creek Road to Broadus	680	650	1,695	1,970
FAP 23				
Miles City to Broadus	455	457	869	970
FAS 447				
Ashland to Mine #4 (14.0 miles)	195	195	483	825
FAS 566				
Ashland to Mine #1 (7.0 miles)	115	722	1,272	215
FAS 484				
U.S. 212 to Mines #2 & #3 (6.0 miles)	110	110	1,143	1,950
Unnumbered Road				
Ashland to Mine #5 (3.0 miles)	n/a[a]	n/a	n/a	700
FAS 332 (Tongue River Road)				
FAP 23 to FAS 447	30	64	83	80
South Fork Crow Creek Road				
FAP 39 to FAS 447 to Mine #4	45	45	129	260

[a] n/a = traffic counts were unavailable

A3.1.4.2 Highway Maintenance and Improvements

The Montana Department of Highway's highway sufficiency rating system was used to determine those primary highway system improvements that would be needed, if the Proposed Action and the related actions were to occur.[30] This system assigns points to each highway segment for the following characteristics: (1) foundation; (2) surface; (3) drainage; (4) safety; (5) capacity. The points are totaled to create the sufficiency rating. On an evaluation scale of 0 to 100, a rating of 0 to 40 indicates immediate improvement is warranted; a score of 41 to 60 indicates that the segment is approaching obsolescence and should be improved within 5 to 10 years; a score of 61 to 100 indicates that the highway segment is in tolerable to excellent condition, and that improvements are not needed.[31]

After a review of the current condition of each primary highway segment in the project area, the following segments were eliminated from consideration:

(1) Those segments with a current sufficiency rating of 60 or less--as they would be improved within the next 10 years, with or without the development of the Proposed Action and of the related actions.
(2) Those segments that currently are under construction or are in the planning or design stages of construction.[32]

Three primary highway segments, totaling approximately 54 nondeficient highway miles, were retained for further analysis.

The focus for the analysis of the remaining primary highway segments was the capacity of each segment to withstand projected traffic. A highway capacity rating was calculated for each highway segment with the ratio of DHV/SV--in which DHV is the Design Hour Volume of traffic and SV is the Service Volume of the road. The difference between the existing capacity rating and the future capacity rating, based upon projected traffic volumes, was subtracted from the current sufficiency rating. The resultant sufficiency rating indicates whether highway improvements may be warranted, based upon capacity considerations. The impact on highway safety also was factored into the analysis. A sufficiency rating of less than 60 signifies that highway improvement may be required. Primary highway improvement costs were assumed to be $500,000 per mile.[33] Table A3-23 presents the results of this analysis.

Secondary highways were assessed differently. Since these roads currently are not paved, the pertinent question was whether the projected traffic levels would require the respective counties to pave them. A threshold of 300 cars per day was used to determine whether paving should be initiated. The paving cost was assumed to be $450,000 per mile.[34]

TABLE A3-23

CALCULATION OF PROJECTED SUFFICIENCY RATING, IN 2011, BY HIGHWAY SEGMENT
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO[a]

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		MILEAGE		ADHT[c]				CR[f]		SR AFTER NEW ADHT	SR AFTER OTHER ADJUSTMENTS (NOTE ADJUSTMENT CAUSE)
HIGHWAY NO.	SEGMENT	NOT DEFICIENT	SR (1980)[b]	1981	2011	SV[d]	DHV[e]	1981	2011	2011	
FAP 39	MP[g] 4.2 to MP 13.2	6.8	76	560	1,280	294	166	26	22	72	>60
	MP 13.2 to MP 13.9	0.5	73	560	1,280	235	166	25	19	67	>60
	MP 13.9 to MP 21.4	5.8	79	569	1,280	264	166	25	20	74	>60
	MP 42.4 to I-94	5.9	88	1,198	1,625	555	211	25	24	87	>60
FAP 37	MP 79.2 to MP 82.4	2.2	71	675	1,970	204	256	23	11	59	
	MP 82.4 to MP 84.7	1.5	69	682	1,970	248	256	24	14	59	
	MP 84.7 to MP 95.7	8.2	75	683	1,970	390	256	26	20	69	>60
	MP 95.7 to US 312	5.9	75	652	1,970	299	256	26	17	66	>60
FAP 23	MP 14.6 to MP 27.8	11.0	84	512	970	517	126	28	26	82	>60
	MP 27.8 to MP 33.1	4.8	91	434	970	592	126	28	27	90	>60
	MP 76.3 to MP 77.8 (on US 212)	1.1	76	1,192	2,941	165	382	14	0	62	<60
	TOTALS	53.7									

a Sources of data include the following:
- Columns 1-4, 7, and 9: Montana Department of Highways, 1980 Montana Primary Highway Sufficiency Ratings, pp. 49, 63-64
- Column 6 = estimate based upon population change and work trips to/from mines
- Column 8 = column 6 x .13; .13 is factor used by the State of Montana to derive DHV from ADHT (see source #1)
- Column 11 = Column 4 - (Column 9 - Column 10)
- Column 12 = Column 11 - [1 - (CR_{2011}) (CR_{1980})] [safety factor]

b SR = sufficiency rating
c ADHT = average daily highway traffic
d SV = service volume
e DHV = design hour vehicles
f CR = capacity rating
g MP = mile post

To estimate the increased maintenance requirements, state-maintained (primary) highways were distinguished from county-maintained (secondary) highways. The major component of primary highway maintenance that may be affected by population growth is pavement resurfacing (see Table A3-24). The method applied to estimate the need for possible resurfacing involved the description of a highway's pavement condition by means of a pavement serviceability rating. On the serviceability scale, newly constructed pavement carries a rating of 4.0 to 5.0, and pavement that has reached its design life bears a rating ranging from 2.0, for low volume roads, to 2.5, for high volume roads.[35] A 20-year pavement life cycle can be reasonably assumed for Montana highways, according to the Montana Department of Highways. A change in highway traffic would decrease the life cycle of that pavement, in direct proportion to the increase in traffic.[36] The frequency of paving attributable to the rail line and to the related actions was considered to equal the ratio of impact traffic and baseline cumulative traffic during the 1984-2011 period, multiplied by the baseline paving frequency of 1.5. The component 1.5 was derived from the assumption that the frequency of maintenance-paving in the baseline case would be every 20 years, or 1.5 times between 1980 and 2011.[37]

The estimates of maintenance costs for secondary roads were determined from per capita expenditure levels in each county. The per capita figures were derived from those expenditures made by each county for streets and roads during the last 2 to 3 fiscal years. These factors then were applied to impact population projections to obtain the potential increases in road and street costs, by county. Implicit in this approach is the assumption that maintenance costs would vary in direct proportion to the increases in population.[38]

Primary Highway Maintenance and Improvements

As a result of the projected traffic volume increases, some of the primary highway segments would need improvements--such as widening, realigning, and structural enhancement. Table A3-23 presents the sufficiency rating for primary Montana highways. Tables A3-24 and A3-25 present the estimated primary highway improvement and maintenance costs. Approximately 4.8 miles of primary highway in the project area might require improvement. This total mileage is small because much of the project area's primary highway system already is in need of improvement; several miles of the area's primary system currently are scheduled for improvement, are in the process of reconstruction, or recently were improved.[39] The cost of the necessary primary highway improvements is estimated at $2.5 million. The same highway improvements would be required for the low production and for the high production scenarios. Under the high scenario, an additional 14.6 miles of primary highway might require improvement, adding $7.3 million to the low/medium scenario costs.

TABLE A3-24

PROJECTED PRIMARY HIGHWAY SYSTEM MAINTENANCE COSTS ATTRIBUTABLE TO THE RAIL LINE AND THE RELATED ACTIONS 1980-2011, MEDIUM PRODUCTION SCENARIO

HIGHWAY SEGMENT	AVERAGE DAILY HIGHWAY TRAFFIC 1980	1991	2001	2011	MILES	CUMULATIVE VEHICLE MILES (Millions) BASELINE (BL)	MEDIUM SCENARIO (MS)	$\frac{MS}{BL}$	ADDED PAVEMENT MAINTENANCE COST
FAP 39									
I-94 to Colstrip	1,200	998	1,466	1,630	29	381.1	456.0	1.20	$ 650,000
Colstrip to Lame Deer	560	557	985	1,280	22	134.9	216.8	1.61	$ 1,510,000
FAP 37									
Lame Deer to Ashland	940	1,438	2,499	2,910	21	216.2	446.5	2.07	$ 2,530,000
Ashland to Otter Creek Road (FAS 484)	740	860	2,481	3,520	4	32.4	80.4	2.48	$ 665,000
Otter Creek Road to Broadus	680	650	1,695	1,970	37	275.5	535.5	1.94	$ 3,915,000
FAP 23									
Miles City to Broadus	455	457	869	970	79	393.6	617.8	1.57	$ 5,065,000
TOTAL									$14,335,000

TABLE A3-25

POTENTIAL HIGHWAY IMPROVEMENT REQUIREMENTS
PROPOSED ACTION/MEDIUM PRODUCTION SCENARIO

HIGHWAY	SEGMENT	MILEAGE PROJECTED TO NEED UPGRADING	COST TO UPGRADE[a]	APPROX. TIME UPGRADING MAY BE NEEDED
PRIMARY				
FAP 37	MP 79.2 to MP 82.4	2.2	$ 1.1	2001-2011
	MP 82.4 to MP 84.7	1.5	0.8	2001-2011
FAP 23	MP 76.3 to MP 77.8	1.1	0.6	2001-2011
SECONDARY				
FAS 447	Ashland to Mine #4	13.8	6.2	2001-2011
FAS 484	U.S. 212 to Mines #2 and #3	6.2	2.8	1996-2006
FAS 566	Ashland to Mine #1	6.6	3.0	1991-2001
Unnumbered Road	Ashland to Mine #5	2.8	1.3	2001-2011
TOTALS		34.2	$15.8	

[a] 1981 $000,000s.

Secondary Highway Maintenance and Improvements

The traffic increases projected for the secondary highway system are presented in Table A3-22. Secondary roads that may require paving are presented in Table A3-25. Secondary roads' maintenance requirements are included in the fiscal impact analysis presented in section A2.0.

A3.2 TONGUE RIVER ROAD ALTERNATIVE

A3.2.1 Construction

The construction of the Tongue River Road alternative route would affect the project area's transportation in much the same way as would the construction of the proposed railroad. Vehicle delays experienced at locations where the TRRC rail line would cross a public or a private road would differ insofar as the crossings would change if the Tongue River Road alternative were selected. This alternative route includes 18 public crossings, of which 7 are grade separated. The constant maintenance of a single vehicle traffic lane at each crossing would ensure minimal delays during construction.

A3.2.2 Operation and Maintenance

A3.2.2.1 Delay of Highway Traffic at Grade Crossings

The delay of vehicles at rail/highway crossings along the Tongue River Road alternative route was determined by the same methods as those described for the proposed railroad. General vehicle delay projections for the Tongue River Road alternative are similar to those estimations for the proposed rail line. The Tongue River Road alternative route crosses more rural roads than does the proposed rail line. These crossings are characterized by low ADHT and high train speeds, which result in very few delays.

A3.2.2.2 Disruption in Community Services

Fire and medical service delays also were estimated for the communities affected by the TRRC trains that would operate along the Tongue River Road alternative route. The figures for emergency service delays on the alternative correspond to those figures determined for the proposed railroad. Although the Tongue River Road alternative route includes an at-grade crossing near Brandenberg on the Tongue River Road--a crossing which the proposed railroad does not include--the probability of delay for trips from Ashland to Miles City does not exceed 4 percent during the analysis period.

A3.2.2.3 Community Development Implications

Trains operating on the Tongue River Road route would affect community development in the same fashion as would trains operating on the proposed rail line.

A3.2.2.4 Mitigative Measures

The mitigative measures considered in the transportation impact discussion for the proposed rail line are applicable to the Tongue River Road alternative.

A3.2.3 Downline Operations

Trains operating on the Tongue River Road route would reach the same terminal points as would those on the proposed railroad. The downline corridors for this alternative and impacts to downline communities would not differ from the proposed railroad.

A3.2.4 Related Actions

Trains operating on the Tongue River Road route would serve the same potential mines as those on the proposed rail line. Therefore, the related actions' impacts to area transportation systems would be the same for both routes.

A3.3. MOON CREEK ALTERNATIVE

A3.3.1 Construction

The construction of the Moon Creek alternative route would affect the project area's transportation in much the same way as would the construction of the proposed railroad. Vehicle delays experienced at locations where the TRRC rail line would cross a public or a private road would differ insofar as the crossings would change if the Moon Creek route were selected. This alternative route includes 12 public crossings, of which 7 are grade separated. The constant maintenance of a single vehicle traffic lane at each crossing would ensure minimal delays during construction.

A3.3.2 Operation and Maintenance

A3.3.2.1 Delay of Highway Traffic at Grade Crossings

The delay of vehicles at rail/highway crossings along the Moon Creek route was determined by the same methods as those described for the proposed railroad. General vehicle delay projections for the Moon Creek alternative are identical to those estimations for the proposed railroad.

A3.3.2.2 Disruption in Community Services

Fire and medical service delays also were estimated for the communities affected by the TRRC trains that would operate along the Moon Creek route. The figures for emergency services delays on this alternative correspond to those figures presented for the proposed railroad.

A3.3.2.3 Community Development Implications

Trains operating on the Moon Creek route would affect community development in the same fashion as would those operating on the proposed rail line. However, trains routed along Moon Creek would not impact Branum Lake Fishing Access Site.

A3.3.2.4 Mitigative Measures

The mitigative measures considered in the transportation impact discussion for the proposed rail line are applicable to the Moon Creek alternative.

A3.3.3 Downline Operations

Trains operating on the Moon Creek route would reach the same terminal points as would those on the proposed railroad. The downline corridor for this alternative and its impacts to downline communities would not differ from the proposed railroad.

A3.3.4 Related Actions

Trains operating on the Moon Creek route would serve the same potential mines as would those operating on the proposed rail line. Therefore, the related actions' impacts to area transportation systems would be the same for both routes.

A3.4 COLSTRIP ALTERNATIVE

A3.4.1 Construction

The construction of the Colstrip alternative route would affect project area transportation differently from the proposed rail line. The Colstrip route would not cause as great an increase in vehicle traffic volumes on the Tongue River Road as would either the proposed railroad or the other alternatives. Vehicle delays experienced at locations where the TRRC rail line would cross a public or a private road would differ insofar as the Colstrip route differs from the proposed rail line. The alternative route includes 11 public crossings, of which 7 are grade separated. The constant maintenance of one vehicle traffic lane at each crossing would minimize delays during construction.

A3.4.2 Operation and Maintenance

A3.4.2.1 Delay of Highway Traffic at Grade Crossings

The delay of vehicles at rail/highway crossings along the alternative route was determined by the same methods as those described for the proposed rail line.[40] The potential delays associated with the Colstrip route are considerably different from those delays related to the proposed railroad, particularly for Miles City, Forsyth, and Colstrip. Were the Colstrip route chosen, the TRRC trains would operate on the Colstrip rail line to Forsyth.[41] The TRRC trains would all no longer run through Miles City. With the Colstrip route, only eastbound trains would be routed through Miles City, and thereafter run only on the Burlington Northern mainline. Thus, train volumes and, consequently, traffic delays would be reduced in Miles City.

Because the more numerous eastbound trains would be routed through Forsyth under this alternative, Forsyth would experience an increase in train volumes and a corresponding increase in vehicular delays. Table A3-26 presents the projections for delays along the Colstrip route. Overall, fewer delays would be experienced in the project area

TABLE A3-26

AVERAGE DAILY VEHICULAR DELAYS AT CROSSINGS
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO[a]
(minutes)

LOCATION AND DELAY STATISTICS	1986/87	1991	1996	2001	2006	2011
Colstrip						
Delayed Vehicles	11	26	73	139	184	229
Average Delay/vehicle[b]	2.5	2.5	2.5	2.5	2.5	2.5
% of Trips Delayed[c]	0.0	0.2	0.4	0.8	1.0	1.2
Forsyth						
Delayed Vehicles	37	62	184	360	492	633
Average Delay/vehicle	4.0	4.0	4.0	4.0	4.0	4.0
% of Trips Delayed	0.3	0.5	1.5	2.8	3.7	4.6
Miles City						
Delayed Vehicles	62	103	279	486	630	829
Average Delay/vehicle	2.0	2.0	2.0	2.0	2.0	2.0
% of Trips Delayed	0.1	0.2	0.6	1.2	1.5	1.9
Rural-TR						
Delayed Vehicles	8	23	66	122	162	203
Average Delay/vehicle	1.6	1.6	1.6	1.6	1.6	1.6
% of Trips Delayed[d]	0.2	0.7	1.8	3.1	4.0	4.9
Rural-BN						
Delayed Vehicles	5	7	20	35	49	62
Average Delay/vehicle	0.2	0.2	0.2	0.2	0.2	0.2
% of Trips Delayed	0.2	0.3	0.8	1.4	1.9	2.3
Total						
Delayed Vehicles	123	221	622	1,142	1,525	1,956
Average Delay/vehicle	2.6	2.6	2.6	2.6	2.6	2.6
% of Trips Delayed[e]	0.1	0.2	0.6	1.0	1.3	1.6

[a] The table does not include delays for emergency and fire vehicles. These figures are presented in separate tables.

[b] The average delay per vehicle is the weighted average for all delayed vehicles.

[c] The percent of trips delayed in towns = total delayed vehicles/ (population ·/. 2.8 persons per household x 10 trips per household per day).

[d] The percent of trips delayed in rural areas = delayed vehicles ·/. AADT at crossings, which also equals the probability of delay at crossings/.

[e] The percent of trips delayed for all areas is calculated as per footnote 1 in the text, using the regional population.

if the Colstrip route were selected. The number of vehicles delayed would be 20 to 34 percent less under the Colstrip route than under the other routes. However, the variation in the percentage of delayed area-wide trips is not significantly different among the alternatives. The difference in average per vehicle delay is negligible.

A3.4.2.2 Disruption in Community Services

Fire and medical service delays also were estimated for the communities affected by the TRRC trains that would operate along the Colstrip route.[42] Tables A3-27 and A3-28 present those delay estimates for the Colstrip alternative route.

TABLE A3-27

PROJECTED ANNUAL MEDICAL EMERGENCY DELAYS
COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO

LOCATION	YEAR	ESTIMATED NUMBER OF EMERGENCY CALLS DELAYED BY TRRC TRAINS	ESTIMATED NUMBER OF EMERGENCY CALLS DELAYED BY NON-TRRC TRAINS	PERCENTAGE OF EMERGENCY CALLS DELAYED BY TRRC TRAINS	PERCENTAGE OF EMERGENCY CALLS DELAYED BY NON-TRRC TRAINS	ESTIMATED DURATION OF DELAYS (minutes)
Miles City	1986/87	-0-	-0-	0.0%	0%	0.0
	1991	-0-	-0-	0.0%	0%	0.0
	1996	-0-	-0-	0.0%	0%	0.0
	2001	-0-	-0-	0.0%	0%	0.0
	2006	-0-	-0-	0.0%	0%	0.0
	2011	-0-	-0-	0.0%	0%	0.0
Forsyth	1986/87	2	35	1.0%	18.9%	4.0
	1991	3	41	1.7%	22.2%	4.0
	1996	10	52	4.8%	26.0%	4.0
	2001	18	56	8.7%	26.7%	4.0
	2006	25	63	11.6%	28.6%	4.0
	2011	32	71	14.3%	31.6%	4.0

The significant differences between the Colstrip route and the other routes are those emergency service delays projected for Miles City and Forsyth. The city of Colstrip would remain unaffected even were the Colstrip route selected, since two grade-separated rail crossings currently are being constructed in Colstrip. Although some emergency service delays would occur in Miles City under the proposed railroad and under the Tongue River Road alternative route, none would be experienced in Miles City under the Colstrip alternative route, since there is a grade-separated crossing of the BN mainline in that community. The TRRC trains would add to the frequency of emergency-service delays in Forsyth, if the Colstrip route were selected.

TABLE A3-28

PROJECTED ANNUAL FIRE EMERGENCY DELAYS
COLSTRIP ALTERNATIVE/MEDIUMPRODUCTION SCENARIO

LOCATION	YEAR	ESTIMATED NUMBER OF EMERGENCY CALLS DELAYED BY TRRC TRAINS	ESTIMATED NUMBER OF EMERGENCY CALLS DELAYED BY NON-TRRC TRAINS	PERCENTAGE OF EMERGENCY CALLS DELAYED BY TRRC TRAINS	PERCENTAGE OF EMERGENCY CALLS DELAYED BY NON-TRRC TRAINS	ESTIMATED DURATION OF DELAYS (minutes)
Miles City	1986/87	-0-	-0-	0.0%	0.0%	0.0
	1991	-0-	-0-	0.0%	0.0%	0.0
	1996	-0-	-0-	0.0%	0.0%	0.0
	2001	-0-	-0-	0.0%	0.0%	0.0
	2006	-0-	-0-	0.0%	0.0%	0.0
	2011	-0-	-0-	0.0%	0.0%	0.0
Forsyth	1986/87	0-1	3	0.8%	16.7%	4.0
	1991	0-1	3	2.3%	17.3%	4.0
	1996	1	4	3.8%	20.5%	4.0
	2001	1	4	5.1%	21.1%	4.0
	2006	2	5	9.3%	23.0%	4.0
	2011	3	6	11.3%	25.1%	4.0

Delays in Forsyth under the Colstrip route would be approximately 200 percent of the delays projected under the proposed railroad.

A3.4.2.3 Community Development Implications

The Colstrip route would affect community development differently from the proposed railroad. The Colstrip alternative route affects accessibility in Colstrip as well as Forsyth and Miles City. Also, Forsyth is more adversely affected under the Colstrip alternative route since it is projected to experience more than twice the delays under this alternative relative to the proposed railroad, i.e., 633 versus 294 delays per day. The effect on Miles City of the respective rail line alternatives is just the reverse. The delays in Miles City under the Colstrip route are less than one-half of those projected under the proposed railroad, i.e., 829 versus 2,018 vehicles delayed per day.

A3.4.2.4 Mitigative Measures

The mitigative measures considered in the transportation impact discussion for the Proposed Action are applicable to the Colstrip alternative route. Were the Colstrip route selected, fewer crossings would need upgrading, but the cost for this upgrading would be considerably higher. The higher cost can be attributed to the need for grade-separated crossings. Table A3-29 presents the crossing improvements required for the Colstrip alternative route.

TABLE A3-29

POTENTIAL PROJECT AREA CROSSING IMPROVEMENT REQUIREMENTS
COLSTRIP ALTERNATIVE

CROSSING IMPROVEMENT	NUMBER OF CROSSINGS THAT MAY REQUIRE UPGRADING[a] LOW SCENARIO	MEDIUM SCENARIO	HIGH SCENARIO
Crossbucks	-0-	-0-	-0-
Flashing Lights	3	3	4
Gates	1	-0-	-0-
Grade Separation	-0-	1	1
Total	4	4	5
COST TO UPGRADE[b]	$395,000	$3,770,000	$3,860,000

[a] Based on Montana Department of Highways criteria
[b] Assumes a cost per warning device of: CB = $4,000; FL = $90,000; G = $125,000; GS = $3,500,000.

A3.4.3 Downline Operations

The Colstrip alternative would reach the same terminal points as would the proposed railroad. The downline corridors for this alternative and impacts to downline communities would not differ from the proposed railroad.

A3.4.4 Related Actions

Trains operating on the Colstrip route would serve the same potential mines as would those on the proposed railroad. Therefore, the related actions' impacts to area transportation systems would be the same for both routes.

A3.5 FOOTNOTES

1. The equation used to estimate trips is the following:

$$\text{Trips} = \frac{P}{2.81} \times 10$$

Where $\underline{P}$ = population
2.81 = persons per household
10 = average daily trips per household

The equation was specified by the Interstate Commerce Commission, "Detailed Outline: Tongue River Railroad EIS," Washington, D.C., December 8, 1980, Appendix F.

2. The portion of the BN mainline included in this analysis lies within the three-county project area. An inventory of rail/highway crossings including crossing identification, warning device, and ADHT was provided by the Planning and Research Bureau, Montana Department of Highways, Helena, Montana, February 1981. TRRC-crossing information was provided by Intrasearch, Billings, Montana.

3. Train speed data were obtained for each set of crossings from several sources. Burlington Northern, Inc., St. Paul, Minnesota, March 18, 1981, provided average speeds for rural areas of the project area. Projected speeds of TRRC trains in rural areas were derived by using a "train performance calculator" (Peat, Marwick, Mitchell and Company, Washington, D.C., March 1981). Within Miles City, train speeds were observed (Ernst & Whinney, observations conducted in March 1981).

4. The baseline case assumption pertaining to non-TRRC train projections was done to establish a context within which to assess the incremental effects of TRRC trains. See section A3.1.3.2 for more discussion of the baseline case.

5. See the section on Downline Impacts (A3.1.3) for the procedure used to estimate emergency service delays. The only difference between the procedure used for project area communities and downline communities is that the project area communities were analyzed separately rather than in groups.

6. Data were obtained from the following persons:
   - °For Ashland -- Carl Lenyard, Ashland Fire Department Volunteer, March 14, 1981
   - °For Miles City -- Robert Lyman, (retired) Chief, Miles City Fire Department, March 18, 1981

7. The slower train speeds through Forsyth (an average of 13 mph) can be attributed to the fact that the city is a crew change point. The response to medical emergencies in Forsyth entails a large percentage of crossings due to the following reasons: In Forsyth,

every emergency call requires at least one rail crossing for the ambulance and fire service volunteers to travel to the stations. In addition, about one-third of all medical and fire emergencies occur south of the BN main line, and thus necessitate a rail crossing from the north side emergency service stations. There is an overpass on the west side of Forsyth, but this is a more circuitous route to emergencies.

8. Ernst and Ernst, et al., Alternative Solutions to Railroad Impacts on Communities Phase I, for the Minnesota Department of Transportation and the North Dakota State Highway Department, St. Paul, Minnesota, October 1979, p. 36.

9. The automobile traffic and train traffic data required to apply the criteria were provided by other analyses. In applying the criteria, crossing improvements indicated by non-TRRC trains were calculated first. The result is an estimate of crossing improvements that may not be warranted in the baseline case (i.e., without the TRRC rail line and related actions). TRRC trains then were added to other trains and the criteria were reapplied. The additional crossing improvements indicated from the second application were deemed attributable to TRRC trains. Planning and Research Bureau, Montana Department of Highways, Helena, Montana, March 11, 1981.

10. To determine the probable downline routing of TRRC trains, marketing data provided by the Tongue River Railroad Company were used ("Confidential Market Analysis for Tongue River Coal," prepared by Wesco Resources for the Tongue River Railroad Company, July 1980, updated March 1981). The data, which are confidential, indicate the planned and probable destinations of TRRC-originated coal in tons per year from 1986/87 through 1990. Based on these data, possible downline routings of the coal were determined. The downline corridors do not include rail line segments within the three-county project area. These segments are included under the operation and maintenance of the proposed TRRC railroad. The following sources of information were used in making this determination:

(1) Official Railway Guide Index to Railroad Stations, National Railway Publication Company, New York, New York, November/December, 1980.
(2) Handy Railroad Atlas of the United States, Rand McNally and Company, Chicago, 1978.
(3) U.S. Department of Transportation, National Transportation Funds and Choices, Appendix: U.S. Transportation Atlas, Washington, D.C., 1977.
(4) Burlington Northern, Inc., "BN Subsystem Map--Trains Per Day; Coal Routes; Years 1981 and 1985," September, 1980.

The end points of the downline corridors were identified when it was impossible (because of imperfect market knowledge) to designate a continued routing with reasonable accuracy. In July, 1982, the state of

South Dakota acquired the abandoned Milwaukee Road line from Terry, Montana to Ortonville, Minnesota. The Burlington Northern subsequently leased the rail line from the state of South Dakota.

11. Burlington Northern, Inc., Map of Coal Routes showing Merchandise and Coal Traffic, St. Paul, Minnesota, February, 1981.

12. Association of American Railroads, Operating and Traffic Statistics for 1972 and 1979, Washington, D.C., June 1973 and September 1980. Train miles for the Western District Class I Line-haul railroads grew from 240.3 million to 250.2 million or about 0.6 percent per year.

13. Burlington Northern, Inc., Map of Coal Routes showing Merchandise and Coal Traffic, St. Paul, Minnesota, February, 1981; Burlington Northern, Inc., Form 10K, for the fiscal year ended December 31, 1979; Sebasta, James J. and John W. Green, Demand for Montana Coal 1980-1991 Based Upon the Projected Utility Coal Markets and Demand for Wyoming Coal, 1980-1991, Based Upon the Projected Utility Coal Market, prepared for the Office of Technology Assessment, U.S. Congress, Cheyenne, Wyoming, October 1980. Coal production growth rates prepared by the following research efforts were reviewed:

(1) Data Resources, Inc., 1980
(2) Coal World Coal Study, Coal--Bridge to the Future, 1980
(3) Bureau of Land Management - Draft Environmental Statement, Federal Coal Management Program, April 1979
(4) National Transportation Policy Study Commission, Final Report, June 1979
(5) TRW Energy Systems Planning Division, Coal Supply/Demand, Final Review Draft
(6) Energy Information Administration, Energy Forecasts for the Annual Report to Congress
(7) Energy Information Administration, Energy Forecasts for the Annual Report to Congress
(8) National Coal Association, NCA Economics Committee, Long Term Forecast, February 1980
(9) Electric Power Research Institute - Overview and Strategy, 1980 - 1984 R-D Program Plan
(10) DOE/Leasing Policy Development Office, Preliminary National and Regional Coal Production Goals for 1985, 1990, and 1995, July 1980
(11) Burlington Northern, Inc., Form 10-K, for the fiscal year ended December 31, 1979
(12) Demand for Montana coal 1980-1991 based on Projected Utility Coal Market, Office of Technology Assessment, October 1980
(13) Demand for Wyoming coal 1980-1991 based on Projected Utility Coal Market, Office of Technology Assessment, October 1980

14. Peat, Marwick, Mitchell & Company, Washington, D.C., March 1981.

15. This distribution was based on relative trains per day projected by the BN for the line in 1985, as well as the relative capacity of the lines according to Peat, Marwick, Mitchell & Company. Burlington Northern, Inc., Map of Coal Routes Showing Merchandise and Coal Traffic, St. Paul, Minnesota, February 1981.

16. The communities were identified using United States Geological Survey quadrangle maps. United States Geological Survey, State Quadrangle Maps, 7.5 and 15 Minute Series, various dates. The 7.5-minute series maps were used whenever available. The scale is 1:24,000. One inch on the map represents 2,000 feet on the ground. The 15 minute series maps are not as detailed, with a scale of 1:62,500. One inch on these maps represents about 1 mile on the ground. Most communities were covered by the 7.5-minute series. The final list was verified by reference to state highway maps and contact with personnel of each state.

17. The sample was a stratified random sample of communities selected using four community categories based on population size and proximity to the rail line. Ernst and Whinney, consultants, have previously determined that these two characteristics tend to distinguish communities in terms of the nature and extent of impacts associated with train operations. (Ernst & Ernst, et al.) Communities with a population split of 10% or less were classified as "not divided" by the rail line; others were classified as "divided."

18. Telephone interviews with Russel Thompson (Burlington Northern, Inc., St. Paul, MN) and Robert Wheeler (Milwaukee, Chicago, and Northwestern Railroad) by Michael Cipolla (Ernst & Whinney), March 18, 1981.

19. In making the estimates, train length was assumed to be 5,900 feet, the length of a typical unit coal train. Merchandise trains typically are shorter than unit coal trains (average length is about 4900 feet). Ernst and Ernst, et al., p. 29. Train speed varies by community and were provided by Burlington Northern, Inc., and by the Milwaukee Railroad. Telephone interviews with Russel Thompson (Burlington Northern, Inc., St. Paul, MN) and Robert Wheeler (Milwaukee, Chicago, and Northwestern Railroad) by Michael Cipolla (Ernst & Whinney), March 18, 1981.

20. U.S. Department of Transportation, Federal Railroad Administration, and Association of American Railroads, computer print-outs from the Grade Crossing Inventory, March 3, 1981.

21. The estimated number of annual one-way trips taken within a community was computed as follows:

E(trips) = (Community population/2.81 per household)
(10 trips per household per day)x(365 days per year)

"The estimate of all one-way trips should be made in the following manner: Community population is known, as is the national average for household size--2.81 persons per household (U.S. Bureau of the Census, Series p-20, No. 327, August, 1978). The number of households can be estimated (population divided by 2.81). A level of 10 one-way trips per household is assumed. This assumption is consistent with material presented in the Institute of Transportation Engineers Trip Generation Report (1976). This figure (i.e., 10 trips per household per day) includes all trips likely to occur in a community, not just those associated with households. The community number of households is combined with the trip generation figure to establish a total count of one-way trips occurring within each community" (as presented in Interstate Commerce Commission, "Detailed Outline--Tongue River Road EIS," December 8, 1980, Appendix F.

22. U.S. Department of Transportation, Federal Railroad Administration, and Association of American Railroads, computer printouts from the Grade Crossing Inventory, March 3, 1981.

23. Ernst & Ernst, et. al., and Ernst & Whinney, et al., Alternative Solutions to Railroad Impacts on Communities, Phase II Report: Case Studies, prepared for the Minnesota Department of Transportation and for the North Dakota State Highway Department, St. Paul, Minnesota, May 1980.

24. Downtown Railroad Grade Separation Study, prepared by Billings/Yellowstone City-County Planning Board, April 1980. Two studies that have been done in the past addressing the rail problem in Billings include: (1) a 1960 study that recommended partially elevating the tracks through the downtown area or relocating the main line adjacent to the interstate highway which circumvents the central business district; (2) a 1971 study recommending construction of two overpasses.

25. If the TRRC trains and other coal traffic were routed over the northern line, through Great Falls, Montana, it is not expected that serious railroad/community conflicts will occur. Only one nongrade-separated crossing occurs in that community, and it is subjected to very low ADT. Current train traffic on that line is very light and no current railroad/community conflict exists. Personal interviews with John E. Montgomery, Planning Director, Cascade County Planning Board; Ben Rangel, City-County Transportation Planner; and Warren Murray, Director of Emergency Preparedness Office, Cascade County; by G.M. Tollefson, HRA, February 4, 1983.

26. To determine appropriate grade-crossing improvements, each state in which a downline corridor segment is located was requested to provide Ernst & Whinney with the improvement criteria it uses. Only Montana and Idaho supplied criteria of sufficient specificity (Letter from James Hahn, Chief, Planning and Research Bureau, Department nu Nighways, Helena, March 11, 1981, and transmittal received from the Idaho Transportation Department, Boise, March 18, 1981). The North

Dakota State Highway Department did mention that its objective is to install automatic gates at all main line crossings (conversation with Don Lascowitz, Transportation Services Division, North Dakota State Highway Department, Bismarck, May 24, 1981). Crossing improvement criteria were also discussed with U.S. Department of Transportation officials. The Federal Railroad Administration indicated that it used criteria presented in a Nebraska study to assess grade-crossing improvements associated with the Coal Line Project (conversation with Mark Yachmetz, National Freight Assistance Programs, Federal Railroad Administration, Washington, D.C., February 23, 1981; Nebraska Department of Roads, Planning Division, _State of Nebraska Coal Train Impact Study_, Lincoln, Nebraska, 1979). The Federal Highway Administration has established specific criteria only for installation of automatic gates when federal financial aid is used: "Automatic gates with flashing light signals are to be installed when . . . multiple main line railroad tracks are present" (see Federal Highway Administration, U.S. Department of Transportation, _Federal and Highway Program Manual_, _Transmittal 129_, April 25, 1975, Washington, D.C.).

27. The two samples were chosen from a listing of all downline crossings obtained from: U.S. Department of Transportation, Federal Railroad Administration, and Association of American Railroads, computer printouts from the _Grade Crossing Inventory_, March 3, 1981. Both samples were stratified according to the percentages of all (urban or rural) crossings accounted for by each downline segment.

28. In reality, causation cannot be distinguished between TRRC and "other" trains because crossing improvements are a function of total traffic. The analysis does show, however, the number of additional crossing improvements that may be needed if the proposed TRRC rail line is constructed and operated at projected traffic levels.

29. The basis for assessing their effectiveness is a prototype study being conducted in Minnesota and North Dakota: Ernst & Whinney, _et al._, _Alternative Solutions to Railroad Impacts_.

30. Planning and Research Bureau, State of Montana Department of Highways, _1980 Montana Primary Highway Sufficiency Ratings_, Montana, December 31, 1981.

31. Ibid., pp. 4, 8.

32. Those highway segments currently under construction or in the planning and design stages of construction are available in a letter from the Planning and Research Bureau, dated July 7, 1981.

33. Planning and Research Bureau, July 7, 1981.

34. Ibid., September 28, 1981.

35. Ernst & Whinney and SYDEC, Management Study Final Report, prepared for the Maine Department of Transportation, Washington, D.C., September 30, 1981, pp. 8-16 through 8-19.

36. This assumes that truck traffic is a constant portion of total traffic.

37. This approach was reviewed and deemed reasonable by the Planning and Research Bureau, Montana Department of Highways, July 7, 1981.

38. Statistical analysis of data on highway expenditures by Montana Counties supports this assumption.

39. Planning and Research Bureau, State of Montana Department of Highways, 1981 Montana Primary Highway Sufficiency Ratings, Helena, Montana, December 31, 1981.

40. Although the calculation procedures were the same, they were applied to a different group of crossings than those five groups outlined in the section discussing the Proposed Action (see section A3.1.2). The group considered for the Colstrip Alternative was the crossings on the BN from Nichols to Colstrip. Planning and Research Bureau, Montana Department of Highways, Helena, Montana, February 1981.

41. Train speed data for Forsyth, upon which calculations of delay are partly based, were obtained from observations conducted by Ernst and Whinney in March 1981. The average of all observations was used.

42. The procedure used to estimate emergency service delays for the Colstrip Alternative is the same as that described for the Proposed Action. The emergency service data were obtained from the following providers in the study area of the Colstrip Alternative:

(1) For Colstrip -- Sgt. Keith Stabelfeldt, Colstrip Police Department, May 26, 1981.
(2) For Forsyth -- John Shorthill, Forsyth Ambulance Service, May 26, 1981.